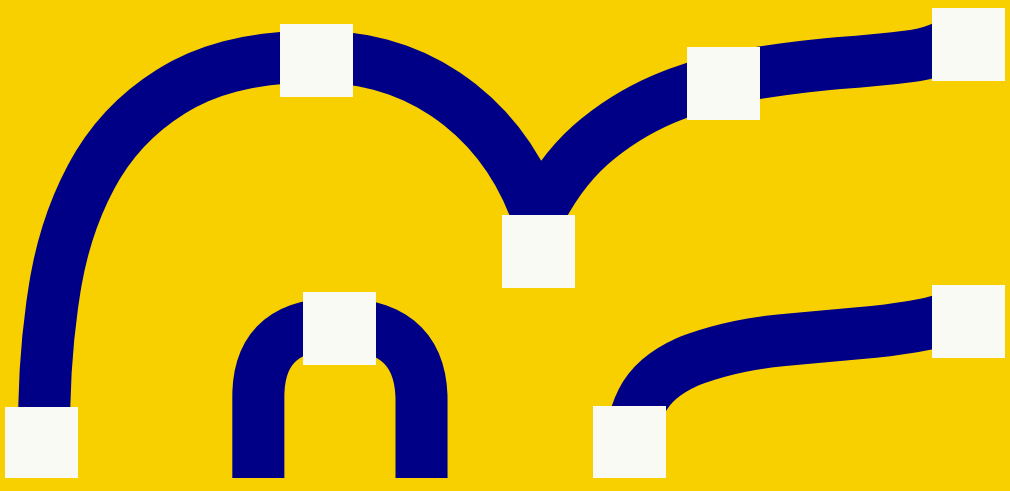
TO GET THERE: DESIGNING TOGETHER

Cumulus Conference Proceedings Paris 2018



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Editor-in Chief
Cumulus President
Luisa Collina

Editors
Césaap
Claire Brunet, President
of the Cumulus Paris 2018
Scientific Committee

Layout
Jani Pulkka

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TO GET THERE: DESIGNING TOGETHER

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Proceedings Series

Cumulus Association of
universities and Colleges
of Art, Design and Media

Paris 2018

Spaces of Play and Language Games

In a conversation with Fulvia Carnevale and John Kelsey published by *Artforum* in 2007, Jacques Rancière suggested that: "The fundamental question (was) to explore the possibility of maintaining spaces of play". This phrase could summarize the whole Cumulus-Paris project "together/to get there". And all the more so since he added that: "The main enemy of artistic creativity as well as of political creativity is consensus". Living, speaking and working together doesn't mean living, speaking or working within given frames and following given rules, but producing language games and accepting the inherent possibility of misunderstandings. Being together is not thinking, speaking and producing everything alike, and consensus is far from an ideal as soon as we want to create! Quite the contrary, being together means recognizing what divides and opposes us, and being able to overcome differences without foreclosing or erasing them. Therefore we have to speak about discrepancies, we have to show them. In fact, we are at a crossroads and we need to question design and its forms and functions. The Paris Cumulus conference would like to address contemporary issues through conversation and critical spirit. It aims to bring together different

design practices and theories, in order to create an open forum for debate between different points of view and practical confrontations. It should set out to recover positive disparities and pluralities within design practices, beyond classical boundaries. It should even stage moments of dissension in order to explore the possibilities of dialogue and perhaps to demonstrate a new type of porosity or permeability, or even new cultural values. It aims to recognize various forms and various degrees of the discipline in order to forge a space of play where making things together is a priority and where we can engage new social subjectivities.Beyond the questions raised by design itself, being together points to the complex interwining of languages we could share. But emphasizing language certainly does not imply emphasizing semantics or meaning in a postmodern way. Here language is to be approached from the political dimension of being together. Let's hope a conference can be an experimental engagement through conversation which allows us to smoothly shift our attention from everyday life. Let's hope it could have a catalyzing effect on the design community by opening up debate. Being together should allow new connections to be made while asking what we have in common, while pointing out similarities among supposedly polarized practices, but also while recognizing differences and stating that they can co-exist.

Claire Brunet
Head of Design Department –
Lecturer at École Normale Supérieure Paris-Saclay
President of the Scientific Committee

Dear Cumulus Members, Colleagues, Students, Friends,

We were back in Paris, the city of Freedom and Revolution, of Love and Poetry. Cumulus is constantly attracted by Paris.

We came here in 2002 thanks to the Cumulus conference hosted by ESAG with an incredible exhibition at the Carousel du Louvre called European Way(s) of Life (EWOL) as visited by over 23,000 people in two weeks. At that time, Cumulus was just European. In addition, one of the students of our member universities that exhibited in EWOL, he is today, in 16 years, the chief designer officer of Pepsi Co. His name is Mauro Porcini. It seems, based on this experience to be in Paris brings luck and broad perspectives! We came back in 2011 hosted by Strate College, after Cumulus conference in Nantes France in 2006; we were already a global association. We came again to take part in this new 2018 Cumulus conference in France organized by the four schools of Art and Design of the city of Paris, the Ecole Boulle, Duperré, Estienne and Ensaama.

The four Cumulus member universities in Paris, also known as Conférence des écoles supérieures d'Arts appliqués de Paris (CÉSAAP), were created in the late 19th Century to educate the best artisans and creators of textile, fashion, metal works, furniture, graphics, etc. adopting a cross-curricular and interdisciplinary approach; combining design with the intelligence of the hands; fostering innovation as well as increasing and updating the values of tradition and handcraft.

In partnership over the past two years within the framework of CÉSAAP, these four Parisian schools decided to welcome Cumulus back to Paris: To share their expertise, to mutualize experiences and display the results through exhibitions and presentations. Quite a brave decision....and what a challenge!

We all know how challenging but always rewarding, too, it can to organize a Cumulus conference as a single institution; we can just imagine the complexity in sharing duties and responsibilities for this demanding task among the four different institutions spread in four different locations in the city of Paris. Thank you to all the heroes and their staff for making it possible: Annie Toulzat, Josiane Giammarinaro, Annie-Claude Ruescas, Laurent Scordino-Mazanec, Etienne Périn, Claire Pinault, Claire Brunet, Laurent Bailly, Anne Barrois, Isabelle Basquin, Caroline Bougourd, Bernard Bréchet, Lucinda Caton, Lyne Cohen-Solal, Gilles Deléris, Jacques-Antoine Drouard, Éric Dubois, Mariette Dupont, Lauriane Duriez, Damien Ehrhardt, Brigitte Flamand, Marie Jonquet, Élisabeth Lafay, Natacha Lallemand, Héloïse Leboucher, Raphaël Lefeuvre, Céline Mallet, Clémence Mergy, Luce Mondor, Yves-Marie Pinel, Rémi Roudeau, Jean-Louis Soubret, Emmanuël Souchier, Apolline Torregrosa, Jean-Christophe Valleran, and all the members of staff of all four schools. This conference was a super positive and a very advanced Cumulus case study.

The title of the conference was summarizing this shared spirit and approach: TOGETHER.

The term Together deeply condenses the fundamental principle of our beloved Cumulus Association to: Do things together; design together; imagine, learn, think, seek, innovate, create, make and build together; To educate and to research together – leaving behind all that divides, opposes and excludes; creating solid and beautiful bridges between different competences, visions and perspectives, cultures and traditions. We met in Paris in April 2018 TOGETHER,

and Cumulus platform being essential to that, to create spaces and times, where and when; to help us all in a collective manner to share perspectives and expertise; to remind us values and meanings.

As in the past conferences, I liked to stress the fact that, I was there on stage alone but not serving the association alone but TOGETHER with wonderful colleagues. Starting from the Cumulus Vice Presidents Elsebeth Gerner Nielsen Denmark and Sam Bucolo Australia that unfortunately couldn't be here with us, and Cumulus Executive Board members José Allard Chile, Mariana Amatullo US, Robin Turner South Africa, Lorenzo Imbesi Italy, Ulrich Schendzielorz Germany, Xiao Yong China, Sara Hyltén-Cavallius Sweden and Rachel Troye Norway: Concluding the list with our essence of Cumulus: General Secretary Eija Salmi and Cumulus coordinator Justyna Molik both from Finland. Thanks to all their support I was able to welcome all conference delegates and contributors to these inspiring days.

TOGETHER finally means to me also to be open to the new, to the ones that are not part of our community yet: New members, new colleagues, new students, new partners.

During these days, we were welcomed new special guests:

The two Cumulus Student Ambassadors nominated by the last 2017 Conference organizer: Ms Saili Palyekar and Mr Nitish Chopra of the Srishti Institute of Art, Design and Technology, Bangalore, India. And the three representatives of Cumulus Plus+ program and coming from Brazil, Macedonia, Tunisia, who brought new horizons for Cumulus by joining this Paris conference: Mrs Polise de Marchi, architect and designer, SENAC University Center, Brazil; Mrs Gordana Verncoska, vice dean of Faculty of Art and Design, European University, Macedonia, Mr Dhafer Ben Khalifa, lecturer at the Higher Institute of Fashion Design Monastir, Tunis, Tunisia.

This conference also opened the door to 25 new Cumulus full and three associate members.

We really invite you to discover these new realities and to start including them deep in our Cumulus Family.

All TOGETHER.

Luisa Collina
Cumulus President

Call for papers and selection procedure

We are very pleased to present the online Paris To Get There – Paris Cumulus Conference Proceedings 2018. The conference call received a great international response with over 180 submissions from more than 50 countries. 62 papers, 2 films and 1 poster were selected from a total of 188 proposals, and all contributions were double-blind peer-reviewed by the international review panel of 80 members. These papers and films were accepted for our Parallel Sessions including oral presentations.

We offered our contributors the possibility of submitting academic or professional proposals (32 academic papers – 33 professional proposals including films and a poster). We would like to take this opportunity to thank all the presenters for submitting their work and attending the conference at École Boulle, École Duperré, École Estienne and Ensaama in April 2018. The Cumulus Conference 2018 in Paris adopted a cross-curricular interdisciplinary approach which highlighted collective and collaborative interest. Thanks to your contribution and the participation of almost 350 delegates during the 3 days of the Conference, we contributed together to make otherness a positive force, and to ensure that design and this union of talents become an undeniable tool for action on reality.

Thank you!

Césaap
(Écoles Boulle, Duperré,
Estienne, Ensaama)
18 boulevard Auguste Blanqui
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I.
TOGETHER, THE NEED FOR A SHARED LANGUAGE?

Does the interdisciplinarity inherent to design imply speaking a common language? Acculturating to the language of the other, inventing a common language and culture in order to understand each other and progress together, could it therefore be the condition of successful interdisciplinary collaboration? But what is the language of designers? How do other professions in design and other disciplines understand design and designers, how the end-users? Have designers invented their own language? If so, what is its nature? How can we evolve in the Tower of Babel that is the manufactory of the world?

The contribution of design and engineering in systemic design practice Analysis and evaluation of two different design approaches

Laura Dominici, Elena Comino, Pier Paolo Peruccio

Abstract

Can a collaboration between Systemic Design and Ecological Engineering make connections between human needs and ecosystems? This paper aims to investigate the systemic approach in design practice, i.e. design language and problem solving tools to face complexity. Systemic Design is a discipline based on Systems Thinking and Human-centred Design methodologies toface challenges of complex systems by an interdisciplinary approach. The need of urban and rural contexts today is to promote more sustainable ways to manage resources, outputs and relationships between actors inside territories. To undertake tangible actions toward sustainable development, we urgently need to establish a strong shared knowledge and operational methods between designers and those who deal with sustainable management and environmental protection: engineers. We compare languages and methodologies involved in Systemic Design and Ecological Engineering practice, two disciplinary fields which are increasingly involved in shared projects. Designing with and for communities, generating ecosystem services and providing innovative and sustainable solutions are some common goals. Through the analysis of some case studies in design practice for sustainable development, we underline similarities and divergences in concepts and methods, and strengths and weaknesses of both approaches. The main purpose is to define tools able to improve the integration of languages, knowledge, competences and methodologies, achieving an interdisciplinary approach in ecological design.

Theme: Language
Keywords: systemic design, ecological engineering, systems thinking, interdisciplinarity, design methodologies

1. Introduction

Looking at contemporary global challenges, we can notice that some of the most important UN programs and platforms, i.e. 2030 Agenda for Sustainable Development, focus on improving and finding solutions for complex issues. Since the publication in 1972 of the first report commissioned by the Club of Rome, *The Limits to Growth*, the environmental issues and the urgency of a sustainable development gradually increased importance. The MIT research team, represented by D. H. Meadows, D. Meadows, J. Randers, W. Behrens III, showed for the first time, through the *World3* computer model (Forrester, 1971), the consequences of the development based on unlimited growth in a world of limited resources. In 1987 the World Commission on Environment and Development (WCED) published the report *Our Common Future*, called also Brundtland Report, that focused on Sustainable Development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987, p. 43).

First the WCED and then the 2030 Agenda established interconnection between these big and common challenges. The 17 SDGs (Partnerships for the goals), formally adopted in September 2015 by 193 member states of the UN, underlines the importance of these interconnections. They expand the Agenda's purpose with issues form different areas, including climate changes, biodiversity and environmental health, human rights and education. All of them are focused on sustainability: environmental, economic, cultural and social sustainability.

Higher education and research are two essential aspects of the 2030 Agenda and of SDGs. Education is one of the most important step to achieve sustainable development, because it provides proper skills and knowledge to promote sustainable action and habits (UN, 2015, p.21). The research in sustainability field should move through three different academic areas: economic science, environmental science and social science (Schoolman, Guest, Bush, Bell, 2011). Research in sustainability field is distinguished by the involvement of different actors, like academic researchers, policymakers, stakeholders and professionals, and by an interdisciplinary methodologies in research practice.

New academic disciplines emerged from sustainability research and from the need to move toward a sustainable development. This happens in different fields such as in economy (i.e. Circular Economy), in design (Systemic Design, Ecodesign etc.) and in engineering (Ecological Engineering, Industrial Symbiosis, Industrial Ecology, etc.). Systemic Design, for

example, is the ability to outline and plan the flow of matter and energy from one system to another, within metabolization processes which reduce the ecological footprint and generate a remarkable economic flow. The final goal is providing benefits for the whole community: total reduction of waste, creation of new job placements, new virtuous cooperation among people and better environmental quality. This model promotes alternative industrial production processes and consumption models. It enhances a better uses of resources and changes the consideration of industrial design practice, looking at the value of territories and relationships between partners.

Ecological Engineering introduces alternative strategies in environmental management, proposing ecological modelling techniques in predicting ecosystem structure and in ecosystem services restoration (Jørgensen, Mitsch, 2004). Ecological Engineering uses ecological science to solve environmental issues. Ecological principles and theories are also essential in Systemic Design practice and learning and we suppose that in the future these two disciplines should work and communicate together toward transforming nowadays societies in resilient communities. These disciplines seem to be complementary when we consider the design for the territory, because they redefine connections between environmental, economic and productive spheres, providing benefits for whole ecosystems. Can be the interconnection between them a possible way to move toward sustainability?

The purpose of this paper is to analyse and compare their methodological approaches to underline similar and divergent aspects. The comparison of tools, methods and languages is useful to understand how we can improve the integration of abilities and knowledge in learning and applying ecological principles in design practice.

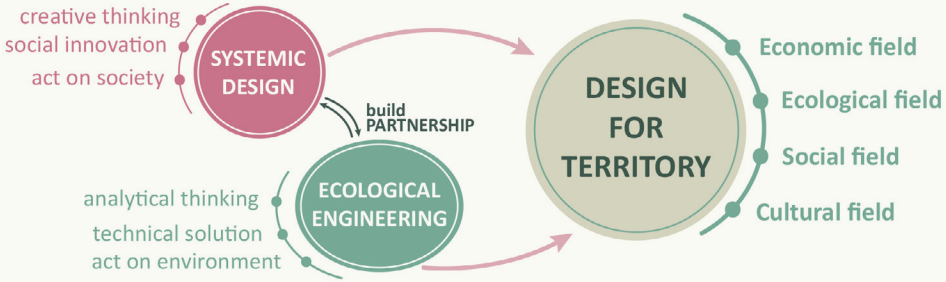


Figure 1. Graphical Abstract.

2. The need to a common language

Sustainable Development became a global issues and its challenges require an interdisciplinary approach to be solved, because they are strongly contextualized in highly complex systems. According to Robinson (2005), traditional disciplinary approach is not proper to understand contexts with a high number of variables and components. Instead interdisciplinarity provides an appropriate approach to address complex issues (Lam, Walker, Hills, 2014), because it provides a mindset able to understand the multi-disciplinary nature of current scenarios (Peruccio, 2017).

In the interdisciplinary view research is a "*cut across boundaries*" practice (Càstan Broto at al., 2009, p. 923): different disciplines collaborate for a common purpose. Mutual learning is useful to build bridges between disciplines and it integrates knowledge, methods, paradigms and theories (Lam, Walker, Hills, 2014). Interdisciplinarity can be defined like "the appropriate combinations of knowledges from many different academic fields, that give a new light on actual problems (Brewer, 1999, p. 328). It promotes the arrangement of appropriate problem-solving methods to face complexity, moving across rigid boundaries.

Looking for approaching interdisciplinarity, Systems Thinking, based on seven principles of General Systems Theory (Von Bertalanffy, 1968), could be a very useful tool to understand complex scenarios. It is a discipline close to management field and it can be defined like a perspective, a specialized language and set of tools to understand and address problems of everyday life.

It is a school of thought that focuses on recognized the interconnections between the parts of a system and combining them into a unified

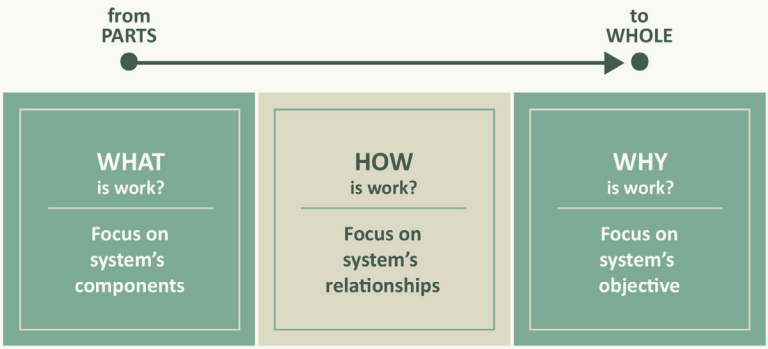


Figure 2. Moving from thinking focused on components to thinking focused on whole system.

view of whole (Kim, 2000). According to Pourdehnad et al. (2011), Systems Thinking is a lens through which look at the world and understand its structures by different perspective. Systems Thinking visualizes *how* a system works and especially *why* it works in that specific way. System's configuration depends by the purpose of the system itself. The "whole" ecosystem is defined by many different subsystems, like social, education and economic systems, but they are artifacts used to simulate and to understand reality (Peruccio, 2017). Based on D. H. Meadows definition (2008), a system can be defined in this way only if there are the following conditions:

- the simultaneous presence of elements of the system (*system's components*);
- the interconnection between these components (*relationships*);
- the definition of a common and specified purpose (*whole system objective*). Whole system works to achieve the objective.

Bologna (2008) suggests that boundaries and limits of systems are flexible and they are arbitrarily set considering the purpose of the observer. In design practice, System Thinking explores possible horizons because it can be adapted to different scales (local, regional and global scale). It can be used to simulate functions of human and natural systems and, working on relationships, it brings out opportunities that enhances territories and empowers communities. It can be also considered like a tool to redesign production systems in balance with the availability of ecosystem services.

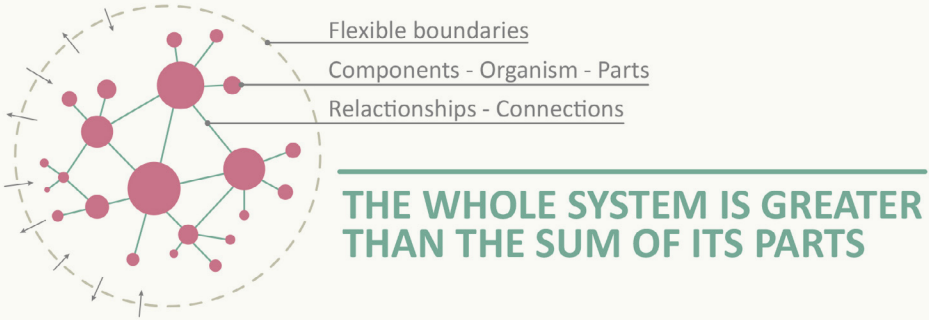


Figure 3. Definition and features of system.

3. Act locally: design "in", "for" and "with" territories

Sustainable Development focuses on development of local communities and on elaborating innovative solutions to build resilience. Technological and social innovation must be contextualized to propose sustainable solutions to real problems. The territory is considered a common ground and the result of complex combination of different variables and components. Territories are systems and their structures depend by relationships between components inside system's boundaries and between them and external context.

In sustainable vision, the man is not anymore placed at the centre of the universe, but it is considered as part of larger ecosystem. All human activities are results of relationships between humans and environment, they depend by the condition of ecosystems and by the amount of available resources and ecosystem services. Design practice is the tangible expression of human purpose to modify the reality (Celaschi, 2017), adapting the environment to human needs. Economic systems and systems production are some examples of this adapting process and innovation contribute to improve the quality of life. Looking at this strong interaction between man and his environment, it is necessary to evaluate the sustainability of human systems, for example using the *Ecological Footprint Analysis* (Ferlaino, 2010). Innovation must also improve and regenerate the quality of context where we live, finding proper solutions in restoring, supporting and enhancing ecosystems and in managing resources and waste. A territory without resources and biodiversity is fragile and this condition influences creative processes to improve local communities. Design processes need to move from Mechanistic paradigm toward Co-evolutive paradigm in which each organism contributes to modify continuously the structure and the arrangement of the whole system, creating new optimal conditions.

Designing for the territory involves a great number of stakeholders, professionals and policymakers. Innovative and sometimes radical solutions need to be communicated using proper language to improve the dialogue and collaboration. The challenge to apply the shifting towards Co-evolutive and Systemic paradigm is building bridges to connect different sphere of reality (Social, Cultural, Economic and Ecological areas) and considering ecosystems as a *Whole*. Connecting different dimensions represents the first step to moving toward an integration of point of views in a interdisciplinary way. Interdisciplinary approach need to involve different actors in design process as important aspect to undertake democratic participation. Participatory Design is a tool to design "WITH" the

territory. It means that designers, engineers and policymakers leave their objective position, over the systems, and they start to act inside the territory, working and communicating with its stakeholders.

3.1 Systemic Design Approach

Systemic Design is developed by the DAD – Department of Architecture and Design of the Politecnico di Torino. Integrating the Systems Thinking with the Human-centred Design, it focuses on processes and connections between system's components. Systemic Design is the result of the increasing attention given to environmental issue in the second part of 20th century. Designers are called to take on with social and environmental responsibility in industrial production, changing their role in the society. Systemic approach looks at natural ecosystems, as the best examples of energy efficiency and zero waste models, and it refers to the generative science. The approach is based on the principle that "the output of a system is the input of another one" (Bistagnino, 2011).

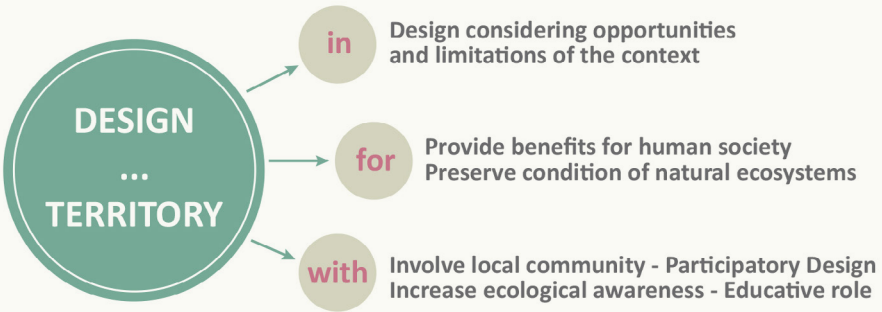


Figure 4. Different faces to design "in", "for" and "with" the territory.

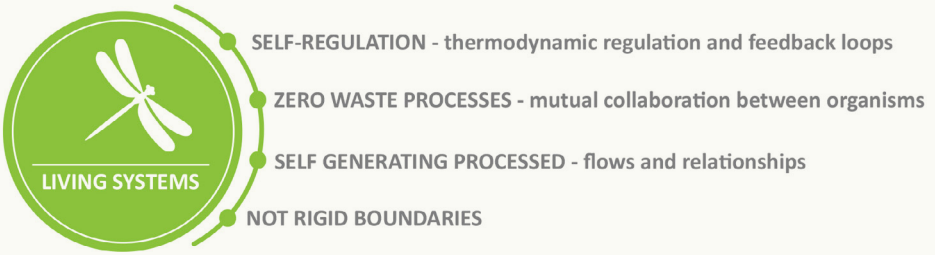


Figure 5. Features proper of living systems.

The main purpose is the reduction of outputs and ecological footprint of industrial processes, achieving zero emission goal. Working locally, Systemic Design focuses on the creation of new job opportunities and it provides benefits for local communities through social innovation. Focusing on industrial production, the application of systemic approach works toward transforming processes considering local resources, opportunities and strengths of the territory. This approach suggests an alternative management of resources and it is a useful tool to define new scenarios for sustainable future (Barbero, 2017). Systemic Design principles (guidelines in design and research practice) are based on these main features of living systems (Bistagnino, 2017):

1. The output of a process become input to another one;
2. Relations generate the system itself;
3. Self-generating (autopoietic) systems sustain and reproduce themselves;
4. Act locally in the context in which it operates;
5. Man connected to own environmental, social, cultural and ethic context.

Regarding paradigms, this approach follows the Systemic paradigm, considering it as set of value and principles of thinking (Kühn, 1962), used to understand complex and non-deterministic systems. Systemic Design education proposes to increase the systemic awareness and systemic mindset in students. It is based on principles suggested by the Constructivist paradigm, focused on the quality of relationships, and by the Project-based learning method, focused on student-centred pedagogy (Dominici, 2017; Battistoni & Barbero, 2017). Another important learning tool is the Participatory Action Research (PAR), based on learning by experience theory of Dewey and on action research theories of Lewin (Dominici, 2016). The PAR methodology promotes a learning approach based on mutual learning, peer-to-peer education (or boss-less education) and community of practice to improve problem-solving skills and the ability to address issues. The research and design methodological approach is characterized by mixed methods of quantitative and qualitative methodologies. It focuses on qualitative analysis of interaction between part of systems and it visualizes connections by flow charts. Applying this mixed methodology, designers have to answer not only to "*WHAT does it work?*", but also to "*WHY does it work like that?*" and "*HOW can we change this?*".

Design method and toolbox are suggested by following steps:

1. Holistic Diagnosis like tool to define relationships and actors of the territory, the material culture (know-how), social, economic, environmental and climatic aspects;
2. Defining current situation of productive model, using flow charts to visualize connections;
3. Identifying problems of the current model;
4. Finding and underlining opportunities through the analysis of possible new relationships between components of the system;
5. Designing the systemic production model based on new relationships and on open systems principles;
6. Establishing connections with the territory and evaluate the impact of outcomes of the systemic model (economic evaluation).
7. These steps are constantly redefined by testing the effectiveness of systemic approach in real contexts (Battistoni & Barbero,2017). Acting locally, the design process is contextualized and it is not considered as general set of rules. Looking at the vocabulary and concepts used in Systemic Design practice, they mainly refers to four areas: Systems Thinking, Management, Socio-humanistic area and Ecological field. This underlines how Systemic Design approach is affected by methods and concept from other disciplines, improving its interdisciplinary attitude.

CONCEPT	FRAMEWORK AREAS	CONCEPT	FRAMEWORK AREAS
Flows		Feedback loops	
Open systems		Input - Output	
Processes (connections)		Qualitative value	
Autopoiesis		Locally	
Self-organization		Material culture	
Mutual learning		Collaboration	

System Thinking · Socio-humanistic area · Ecological field · Management

Table 1. Terms and concepts commonly used in Systemic Design practice.

3.2 Ecological Engineering Approach

Ecological Engineering is an emerging discipline and it answers to the increasing demand for providing benefits for human welfare and preserving natural environment (Bergen, Bolton, Fridley, 2001). It recognizes that humans and their environment are mutually dependent and they cannot be addressed separately. Ecological Engineering practice considers human society and natural environment at the same time, providing benefits for both of them and designing integrating sustainable systems (Mitsch & Jørgensen, 1989; Mitsch, 1996). The terms was coined by H. T. Odum in the 1960s (Odum, 1962, 1971; Odum et al., 1963) and it was firstly defined in terms of energy flows. The discipline refers to the design of those systems in which the energy supplied by man is small in relation to natural resources, but sufficient to produce useful effects (Odum et al., 1963).

Since 1960s, with the increasing attention to environmental issues, applied ecology, as a practical application of ecological theories, has become more popular. But its application was limited to monitoring practices and it was used only as descriptive discipline that shows the impact of human activities on natural environment. According to Odum (1989), we need to apply a prescriptive discipline for providing proper solutions to environmental and complex problems, apparently unsolvable. Ecological Engineering was born to respond at this need of a prescriptive discipline that is moving towards transdisciplinary approach in engineering practice.

Ecological Engineering considers the importance of living systems, looking at them in design practice. Human society and natural ecosystems are considered as complex systems and engineers refer to solutions adopted by living systems to design sustainable alternatives. Relationships between organism and their environment, their self-organization ability and energy laws are considered as guidelines in designing sustainable human systems.

Since 1992 Odum et al. have developed design guidelines based on 20 ecological principles. In 2001 Bergen et al. have defined five design principles:

1. Design consistent with ecological principles. Considering and imitating natural structures and processes means to look at natural systems as partners in design practice;
2. Design for site-specific context;

3. Maintain the independence of design functional requirements from ecosystems functions. Ecosystems can function and provide benefits to society without human intervention;
4. Design for efficiency in energy and information;
5. Acknowledge the values and purpose the value that motivate design.

These five principles represent guidelines for ecological engineers in different applications, including (Bergen et al., 2001):

- the design of ecological systems like alternative to energy-intensive systems (eg. constructed wetland for wastewater treatment);
- the restoration of damaged ecosystems and the mitigation of development activities;
- the management and the preservation of natural resources;
- the integration of human society and ecosystems in built environment.

These five guidelines underline that the Reductionist paradigm, based on analytical and quantitative testing, is not the proper mindset to apply in Ecological Engineering practice. In restoration practice we need to take a systemic approach to recover a damaged ecosystem. For this reason, Ecological Engineering practice is moving toward an "holistic" and "ecology" paradigm that considers theories and concepts of ecology. The methodology of this discipline is presented as a mixed methodology, because it integrates qualitative approach, focused on relationships, with quantitative one, based on data analysis. As engineering discipline, it preserve analytical and technical features, but it propose to integrate them with the systemic thinking.

According to Jørgensen and Nielsen (2012), the design method is proposed in seven steps:

1. define the problem;
2. determine the ecosystems involved;
3. quantify the sources of the problem;
4. set up the diagnosis to understand the relation between the problem and the sources;
5. determine the tools to solve the problem;
6. identify measures and take proper action;

7. follow the recovery process by a wide monitoring program.
8. Ecological modelling, Ecological indicators and Ecosystem services are proposed as tool boxes to support the diagnosis process (step 1). Jørgensen and Nielsen (2012) suggest that using these tool boxes could give the most complete diagnosis. Ecological indicators are holistic tools that provide qualitative data (eg. biodiversity ecosystem indicators), adding to quantitative data. They describe the state of health of natural systems. In addition, the analysis of ecosystem services defines economic value to services provided by natural systems, building bridges between environmental management and economic evaluation.
9. Finally analysing some concepts used in Ecological Engineering practice, they mainly refers to Systems Thinking, Environmental Management, Social Analysis and Living Systems.

CONCEPT	FRAMEWORK AREAS	CONCEPT	FRAMEWORK AREAS
Entropy		Resilience	
Complexity		Relationships	
Co-evolutionary opportunities		Ecosystem services	
Self-organization		Autopoiesis	
Biodiversity		Emergence	
Energy flows			

System Thinking · Socio-humanistic area · Ecological field · Management

Table 2. Terms and concepts commonly used in Ecological Engineering approach.

3.3 Opportunities generated by the application of these approaches

The Systemic Design approach applies to many different fields, defining new opportunities for local activities and companies. Bistagnino and the Systemic Design research team of Politecnico di Torino (2009) propose the application of this approach to the agroindustry production, to the design and management of big events, to the energy field and to waste management. The Systemic Design method is currently applied in the Interreg Europe project Retrace (Barbero, 2017), which focuses on

the development of the method in local and regional policies allowing, the transition toward a Circular Economy.

The study led by Chiaia, Fantilli and Peruccio (2017) shows how the systemic approach connects the design field with construction engineering, considering sustainability as one of its main goals. The purpose of the interdisciplinary teamwork, described in Chiaia, Fantilli, Peruccio (2017), is to reduce the ecological footprint of concrete production and to enhance the outputs of rice crops, for instance in the territories of Novara and Vercelli.

The production of concrete presents many problems due to the use of many resources (inputs) and high emission of CO_2. The industrial process requires a high amount of energy, of water and natural resources, that are consumed faster than they are replaced. For the reduction of the environmental impact, they focused on replacing 20% raw material of the concrete composition with silicon of plant origin, increasing the value of the whole rice biomass. The outputs of rice cultivation are chaff (husk of grain) and straw, that can be used as raw material for other applications in many fields. Rice husks are rich in pure silicon, which can be obtained by burning them without oxygen at a temperature of 800 °C. This silicon can be used in the production of concrete, because it protects the end-material against corrosion and strengthens it. The study is also focusing on the ecodesign of concrete, analysing the environmental impact through LCA, increasing performances through the material performance strategy and comparing these data with structural performances data. A similar approach was also applied at the beginning of this century to the preliminary study for the construction of a security gallery of the Frejus highway tunnel[1], that connects the towns of Modane (France) and Bardonecchia (Italy). The systemic approach applied raised the necessity of finding systemic solutions to the excavation of tons of rock and the impact of logistics activities on the environment and society. The aim of the study was to increase the value of the rock chips (muck), which is mainly considered waste and is rarely used in construction applications. The study proposes using rock chips in rice cultivation: muck is rich in calcerous schist, that can be used to cover soil stressed by intensive agriculture method. This case study shows how designing “open industrial systems”

1 The project was lead by Sitaf spa (Italian society managing the A32 highway and the Frejus Tunnel), Zeri Foundation, Università di Torino (Agricultural Sciences) and Politecnico di Torino (Design, Materials and Mechanical Engineering).

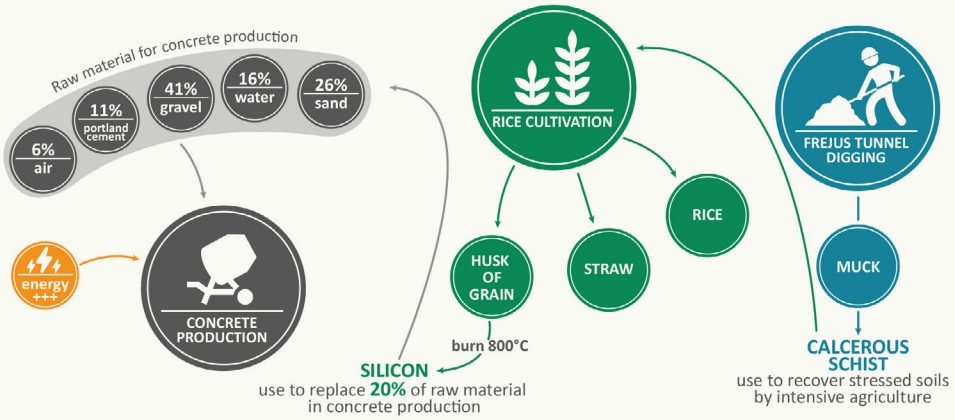


Figure 6. Application of Systemic Design approach in concrete production. 20% of concrete composition can be replaced by vegetable silicon obtained from rice husks (Chiaia, Fantili, Peruccio, 2017).

can create new local opportunities and build bridges between different sectors such as agriculture and industrial cement production.

Another interesting approach to environmental management can be found in three projects collaboration between Italy and France, in the framework of the European Program Alcotra (2007–2013). Alcotra's purpose is to improve the quality of life and promote the sustainable development of local communities. The three projects, *PelliDrac*, *TT:CoCo* and *Alpéril* (Comino, Piccione, Rosso, 2012) take into account social, economic, environmental and cultural aspects of these territories. The partners involved are Politecnico di Torino, Città Metropolitana di Torino e Hautes Alpes Conseil Général. One of the main aims of these projects is to carry out environmental education activities, in order to improve awareness and knowledge of local territories and to educate future generations. The collaboration with local governments is an important aspect and the research group supplies them with technical information about:

- hydrogeologic hazards (debris flow);
- stream dynamics;
- hydraulic building census and monitoring;
- evaluation of ecological indexes and their evolution (eg. through the FFI – Fluvial Functional Index);
- elaboration of management strategies;
- ecological restoration.

The aim of *PellicDrac* is divided into four different objectives, that are described by ten specific and technical activities (A1–A10). First the needs of local people and government are identified (A1). Then a technical analysis (A2–A8) regard hydraulic, hydrogeologic, infrastructural and ecological features (including monitoring and assessment) is performed. The last two steps (A9–A10) focus on communicating results of the studies and on educating people about environmental topics, such as risk management or respect of biodiversity). In addition to school education activities, thematic focus groups are organized inviting local administrations and stakeholders to meet professionals and academics about the topic of natural resources management. The main purpose of these focus groups is improve communication and dialogue with local residents. These meetings also represent the opportunity to meet and to listen to local needs. Involving people in the sustainable management of common resources is an important step of a "*participatory design*" process: ordinary people become active players in the design process. The main result of these focus groups is the publication of a good practices guidelines book, written in Italian and French (Hautes Alpes Conseil Général, 2011). During the Alcotra project TT:CoCo, many other experiences of adult education on environmental topics were organized by the research team in collaboration with local authorities (see the "*River Contract of Pellice Stream Basin*"). Primary, middle and high schools were also involved in a workshop, classroom lessons and in outdoor around the Pellice river, promoting experiential learning. During the Alcotra project, *Alpéril*, the research team created learning materials for primary schools (*Pellibox)* and for



Figure 7. Activities and didactic material produce during PelliDrac, TT:CoCo and Alpéril projects (2007–2013).

middle schools (*Didactic Folder)* and designed the concept of the board game *Fium-Poli. Conoscere I fiumi giocando*. Communication and education become key issues involved in environmental engineering processes, moving toward an humanistic approach to the discipline. It also considers the social impact of engineering practice.

4. Toward an integration of approaches

Case studies presented above are some examples of design "in", "for" and "with" the territory and local communities. The Systemic Design approach, applied in the study led by Chiaia, Fantilli and Peruccio (2017), adds value to local resources enhancing outputs from the cultivation of rice plants. Technical properties of husk of grain are studied and evaluated, proposing to use them for the production of concrete. This case study shows how Systemic Design finds new opportunities in construction engineering, moving toward sustainability and connecting different fields of study. Ecological Engineering approach, applied in PelliDrac, in TT:CoCo and in Alpéril projects, shows how environmental management is a cross-cutting activity. It includes scientific and technical analysis, communication, collaboration with policymakers, local stakeholders and educators. The improvement of dialogue between engineers and local communities is an important step to raise awareness among citizens about an efficient, safe and sustainable management of natural and built environment. Looking at these applications, we suppose that increasing collaboration between Ecological Engineering and Systemic Design can create new opportunities and innovation in local development. Ecological Engineering is recently involved in the development of urban areas, collaborating with landscape architects and urban planners. In urban contexts engineers focus on human health and environmental sustainability and they work to find proper solutions looking at ecologic, economic and social benefits. Systemic Design also focuses on social innovation, finding new job opportunities and challenges for local activities and enterprises. Adopting a community-centred approach and looking at local material culture, designers try to understand social needs and they propose alternative business models for the development of local communities. Ecological engineers and systemic designers, applying different skills, provide goods, services and evaluations to improve social and ecological benefits.

As emerged disciplines, they are improving diagnostic tools and methods to understand the complexity of human and natural systems

and to work with it. To face complexity, they leave reductionist view and they adopt the systemic and ecological paradigm. They apply principles of Systems Thinking to analyse and to read human societies and natural systems, focusing on interconnections between components and on living systems. Looking at methodologies used in Ecological Engineering and Systemic Design, they try to integrate the quantitative analysis with qualitative one. Data collecting and analysis are essential steps in the evaluation of the current conditions of systems, because they suggest a quantitative description of them. But only focusing on quantitative analysis isn't enough to describe properly the complexity of natural and human systems. We need also to investigate relationships and interactions between parts of them and to understand their specific behaviour. Mixing quantitative and qualitative approach gives a more complete description of complex systems. The attitude to design for a specific context (Contextual Design) and holistic evaluation are some essential tools of this mixed approach. Holistic analysis underlines socio-economic, cultural and ecological features useful to define new opportunities in local development. In Systemic Design field, researchers are also using methods and tools from social sciences and economic disciplines to collect data and information, as the action-research method or the application of Grounded Theory. For instance, flow charts are useful tools to visualize data and interactions between components of a complex system and to underline key issues in problem-solving process. In Ecological Engineering, researchers use "ecological indicators" as tools to describe the complexity of ecosystems on local, regional and national scale. The ecological indicators method considers biological, chemical and physical aspects of ecosystems and they are useful tools for policymakers in decision-making processes and in resources management. Environmental and ecological indicators assess and monitor the condition of natural ecosystems affected by human activity. They provide technical information that can also affect other disciplines, as urban planning, economic management, industrial production and agriculture. Using ecological indicators, researchers try to describe the qualitative condition of ecosystems through quantitative information. The aim of the holistic diagnosis is to clearly define the set of research and the best strategy of problem-solving.

Case studies of Alcontra's projects show as Participatory Design is becoming increasingly prominent practice not only for designers, but also for engineers. Participatory Design is an important activity to create dialogue with local people and also to design "with" them and not only

"for" them. In design practice it is the main tool to achieve social innovations in a democratic way, involving in the design process policymakers, stakeholders, citizens and end users. Applying systemic and ecological paradigms, designers and engineers are aware to be parts of the system: they move from considering them above the system (objective set) toward to being part of the system. They need to share their point of view with people and to consider their needs, for designing effective benefits for the whole local community. In Participatory Design practice designers, but also engineers, play the role of facilitator and mediator between citizens, administrators and technical experts. As mediator they have to communicate technical information to local community for raising awareness regard to changes of the territory. Communicate the value of natural resources and heritage and explain the importance to preserve ecosystem services are essential steps to activate changes toward sustainable and participated management of common goods.

Nevertheless systemic designers and ecological engineers present different attitude to design practice. Engineers mainly focus on finding technical solutions that solve a specific problem, following regulations and technical functions. They use deductive reasoning and rational thinking to propose solutions that are technically feasible. Designers use the *design thinking* and divergent thinking to adopt an "*exploratory*" approach to design practice, defining different possible future scenarios. This attitude is related with the creative thinking and holistic thinking and it represents the core of the human-centered innovation process. The

	SYSTEMIC DESIGN	ECOLOGICAL ENGINEERING
PARADIGM	Systemic paradigm	Ecological paradigm
METHODOLOGY	Mixed approach qualitative + quantitative	Mixed approach qualitative + quantitative
METHODS	Holistic diagnosis Interdisciplinary approach Participatory Design Design thinking	Ecological Indexs, Eco-services evaluation Interdisciplinary approach Technical solutions Analytical thinking
CONCEPTS LANGUAGE		
PURPOSES	Social Innovation Sustainable solutions Increase Systemic Awareness	Restore ecosystems Sustainable solutions Provide benefits for human society

Table 3. Comparison between Systemic Design approach and Ecological Engineering approach.

social nature of design practice is a strength to create new opportunities starting from local material culture. On the other hand, technical abilities of engineers and their analytical thinking are necessary to make real possible scenarios. Convergent and divergent thinking are equally important in problem-solving process and this explains why we need to move toward an interdisciplinary approach to learning disciplines, based on collaboration and dialogue.

5. Conclusions

This study underlines strengths and similarities between Systemic Design and Ecological Engineering approach. Improving collaboration between these academic fields can create new opportunities to face current challenges towards sustainability. The application of an interdisciplinary approach to complex issues considers ecological, economic, technological, social and cultural features in problem-solving processes. The main challenge of collaboration between experts from different academic backgrounds is to define common goals and contribution of each discipline to achieve these goals. Education represents the first step to promote a collaborative approach to design practice. To stimulate the interdisciplinary attitude in designer and engineers and dialogue between them, we need to create opportunities where they collaborate for a common purpose.

In the MSc Systemic Design "Aurelio Peccei" of Politecnico di Torino (Italy) and in particular in the course of "Open Sistems Lab", students approach engineering, humanistic and economic aspects to design practice. Regarding the interaction with engineering disciplines, in the course of "Procedures for environmental sustainability" students understand technical and regulation requirements, looking at the sustainability of the projects. Students learn basic concepts of ecology, of resources management (focused on the amount of available resources) and of technical solutions to improve ecosystems. The Sydere Center (Systemic Design Research and Education), design by Politecnico di Torino and ECAM Lyon, is promoting an interdisciplinary and systemic approach to education and research, connecting experts with different background. Regarding the collaboration between universities and local administrations and companies, the interdisciplinary approach is also highlighted in activities promoted by the South China–Torino Collaboration Lab and CeNTO Project (Politecnico di Torino). In the study for the urban development of Yanzhou Island (2016), in Zhaoqing region (China), the masterplan was

defined by an interdisciplinary team of researchers, considering ecological, economic and social impacts of actions proposed. These experiences give some examples to undertake interdisciplinary approach to design "in", "for" and "with" local communities. The integration of methods, abilities and thinking is still an open research field, but it is becoming increasingly important to achieve sustainable and systemic solutions to complex issues.

Laura Dominici
PhD, Polytechnic of Turin,
DIATI Department of Environmental,
Land and Infrastuctural Engineering,
laura.dominici@polito.it

Elena Comino
Associate professor, Polytechnic of Turin,
DIATI Department of Environmental,
Land and Infrastuctural Engineering,
elena.comino@polito.it

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ACRONYMES

An innovative cultural mediation performed by designers and contemporary circus acrobats

Éric Dubois

Abstract

In this article, I will study the ACRONYMES project, in partnership with three French national institutions: École Boulle, school of architecture, design and crafts, The Musée des arts et métiers, which is part of the Conservatoire National des Arts et Métiers (CNAM), centre for adults continuing education and research on engineering sciences and technics, and the Centre national des arts du cirque de Châlons-en-Champagne, school for contemporary circus (CNAC). The ACRONYMES project is an experimental cultural mediation performed by designers and acrobats within the permanent collections of the CNAM, based on the hypothesis that a cultural common ground could exist between design, circus and sciences.

By *cultural mediation* we designers at École Boulle mean exploring the performative dimension of design, placing the designer as an actor, turning body technics and language into conceptual/creative tools. The goal is to question traditional oral/written-based mediation in order to facilitate the understanding of a problem in a scientific/technical context, by allowing the audience to *feel* a content rather than just hear it. Design, circus and sciences share a common history as sciences have long relied on entertaining strategies to get attention and funding from people and politics. Cabinets of curiosities, public courses and events such as world fairs are amongst the numerous examples of this intertwined history. A meaningful theme was chosen: *two are better than one to innovate*.

The ACRONYMES project was meant not only to entertain but also to prove the accuracy of pairing disciplines in a museum and therefore contribute to the evolution of mediation practices thanks to a design approach. It can be considered a first and very experimental on several levels indeed. If it brought to light close similarities in between disciplinary cultures, it also made it very clear designers and acrobats aren't alike. From a more institutional point of view, putting together such a project proved itself particularly ambitious as one year has been necessary to frame, schedule and advertise ACRONYMES. Confidence and friendship between leaders involved, helped push away academic boundaries and explore such a new language.

Theme: Language
Keywords: design, circus acrobats, museum, cultural mediation, body technics

1. A shared history?

The ACRONYMES project started with a guided tour of the Musée des arts et métiers for two classes: the Diplôme Supérieur d'Arts Appliqués Design mention Espace Événementiel et Médiation of École Boulle (DSAA EEM) and the 28th Promotion of the CNAC. École Boulle had previously partnered independently with the CNAC and the CNAM.The visit revealed acrobats and designers shared more than an aesthetic interest in weird weights and clocks or complicated machines and prototypes. A common culture was to be found. Indeed, sciences need regular promotion and publicity and constant funding to pursue the quest for knowledge. People and politics have to be kept aware of innovative and useful discoveries.

The CNAM is most certainly the place to witness how far and deep the relationships between sciences and arts go. As for the cabinets of Physics from the 18th century or later on during the 19th century with the national and world fairs, both scientific and entertaining global events. The key was to make it big, visible and attractive to people. Many more examples could come handy to demonstrate how meaningful and stimulating it has been be to conceive a project involving students from artistic backgrounds to explore such a history. Exhibitions such as Alain Germain, entre costumes et machines held at the CNAM in 2008 proved the subject more than legitimate if necessary.

If whys were quickly answered, many more hows remained: How to welcome designers and acrobats for an experimental event? How to set up an innovative mediation including performances, structures and devices usually meant for circus only? How to deal with safety regarding conservation policy? How to insure security for the general public? How to even get any support from the institution to actually break all established dos and don'ts of the place? And so on... One could stress the ACRONYMES project paved the way for a shared institutional adventure through administrative languages and rules.

2. A shared toolbox?

The CNAM led the administrative part including contracts, finance, logistic and public relation aspects. École Boulle led the conceptual part including the general scenario of the mediation, the balance between contents and scenography, plus all the graphic design. The CNAC led technical, practical and artistic aspects. All together ACRONYMES included more than 15 professionals and 20 students. Leaders first set up a tight

schedule running from September 2015 to March 2016. It included visits to Châlons-en-Champagne for students to meet and exchange knowledge about their mutual disciplines.

Spending time together, getting to know each other to develop confidence between students was essential. Future teams needed to feel involved. By gently allowing Design students to do acrobatics for the first time, contact was smoothly and strongly made. Back on site, the conception process was led by spatial and security constraints. After locating suitable zones to safely set up structures, a first map was drawn. It is from this initial common tool that objects then itinerary were deduced. Happily enough, despite regular changes, there are always several possible objects to support an idea and could be picked up or dropped when made necessary.

The Design students joined in to do some researches and get to know the collections and the history of the place. Mood boards, sketches and time lines were produced to stage the future mediation. Objects had to match from historical, conceptual and artistic points of view and inspire the acrobats by matching their skills too. Skype helped and a shortlist emerged, stretching the mediation through the seven collections to create a full visit of the museum. Lots of creative work was still to be done though. To master time was a key tool to put together the ACRONYMES project as it was most certainly the heaviest constraint of all. Students from École Boulle and CNAC could only meet up at the museum on day 1 of the workshop.

3. A shared body language?

The ACRONYMES project proved itself an outstanding material to draw experience from. If a shared language was ever found, it occurred during the workshop. If Design students could provide the teams with content, scenarios, visuals, scenography, ACRONYMES really was meant to be a dialogue and needed pairing students to fully exist and work. Only when they merged, a shared language could come out loud and clear. Four days to train and three days to perform, that was it to succeed in talking all as one.

Each day started with body stretchings then teams joined their stations, as the collections had been divided into three parts. Each team had the same amount of material to deal with: distance to cover, content to balance between acrobatics and speeches, corridors or rooms to set up

with graphic design, light and sound, to provide the audience with a global experience. Once again, time was the key. The experience had to be dynamic, with changes of rhythm, surprises, intimacy, drama too, to make sure every one felt part of it and kept focused for one hour and thirty minutes.

Gestures, body technics and language were the true shared language as both Design students and Acrobats were responsible within their teams for scientific and artistic contents. Designers performed just as Acrobats explained in a constant change of focus to teach and amaze. One could ask whether ACRONYMES was a show, a performance or a school project... Pointless, the goal was to make a statement and sense. ACRONYMES wasn't a random title after all. Language was at the very core of it all from the beginning: DSAA, CNAC and CNAM may well have succeeded in creating a new shared language in the field of cultural mediation.

Team project Cnac
Karine Noël, Danse Teacher
Marcello Parisse, Technical Director
Cyril Thomas, Project manager for Research and Development
Éric Wenner, Director of Studies
Katy Wolf, Technical Operator

Team project école Boulle
Josiane Giammarinaro, Director of École Boulle
Frédéric Poussin, Technical Director
Éric Dubois, Design Teacher
Claire Brisson, Design Teacher
Anne-Laure Pulcini, Design Teacher
Laurent Lainé, Tapestry Teacher

Team project Musée des arts et métiers
Yves Winkin, Director of the Musée des arts et métiers
Nathalie Vu-Hong, Chief of the Exhibition Department
Cédric Mastellari, Scientific Mediator
Gilles Garel, Gestion of innovation Chair holder

Acronymes on the web
http://www.arts-et-metiers.net/musee/acronymes
http://www.cnac.tv/cnactv-841-Acronymes
http://www.ecole-boulle.org/articles/2999/acronymes-mediation-circassienne-unique-au-musee-des-arts-et-metiers

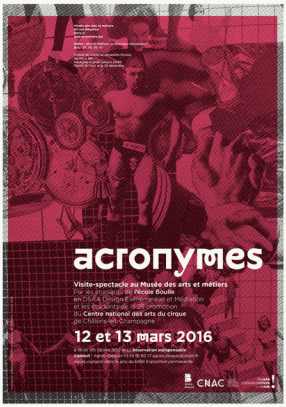






Figure 1. Poster of the event conceived and produced by the Design students of École Boulle. Each poster was printed on A3 drawing paper and customized by free handing extra sketches. Crédit photo: École Boulle – DSAA EEM 2016

Figure 2. Students performing their mediation in the Scientific Instruments Collection. Crédit photo: École Boulle 2016

Figure 3. Student performing her mediation in the Materials Collection. Crédit photo: École Boulle 2016





Figure 4. Students performing their mediation in the Construction Collection. Crédit photo : École Boulle 2016
Figure 5. Students performing their mediation in the Communication Collection. Crédit photo: École Boulle 2016
Figure 6. Students performing their mediation in the Mechanic Collection. Crédit photo: École Boulle 2016









Figure 7. Students performing their mediation in the Transports Collection. Crédit photo: École Boulle 2016
Figure 8. Students performing their mediation in the Transports Collection. Crédit photo: École Boulle 2016
Figure 9. Students performing their mediation in the Chapel. Crédit photo: École Boulle 2016
Figure 10. Group photo after the last mediation. Crédit photo: École Boulle 2016



Leading the Conversation

Why Design Education should care more about Leadership and Stewardship in Design

Jan Eckert

Abstract

As we gain higher design literacy across many domains other than design, more and more actors become involved in the design conversation itself. Amidst this extension of the design discipline, there is an emerging lack of designers who are able to lead this conversation across different sectors and disciplines. In this context, the present paper critically examines the disciplinary approach that is dominating most of today's design curricula and gives an insight into the development of our new undisciplinary MA curriculum in Design. Stepping out of the mental model of the designer as disciplinary problem-solver or author became key to our re-visited curriculum and led us to focus on collaboration, conversation and leadership. A first result of our research represents an alternative model, which we call the Y-shaped-Designer. The development of this model is based on an extended literature review and workshops with both design educators and professionals. At the core of our examination stands the shift of the designer's role in the professional field on the one hand and the required change, which design education needs to face on the other. According to our insights, part of this change is shifting from discipline-based towards problem- or theme-based curricula in design. Curricula, whose main objective is to enable future designers to lead collaborative processes across different disciplines and sectors. Based upon first experiences made with a series of pilot schemes in our MA programme, two concepts emerge as key to such collaborations: Designers as Conversation Leaders and the fundamental shift from authorship towards Stewardship in Design. As a conclusion, this paper proposes a first set of principles of Stewardship in Design – principles that have become central to the development of our new design curriculum and which are shared in this paper in order to initiate future discussion amongst learners, educators and professionals.

Theme: Language
Keywords: design education, Y-shaped-designer, stewardship in design

1. Introduction

At a recent panel discussion during the Innovation by Design Awards the executive director of the New York City Public Design Commission, Justin Garrett Moore, depicted the following state of design: "We have greater design literacy, but where we have a long way to go is who is designing and who is involved in this conversation" (Budds, 2017). While for many decades designers haven't been part of most conversations – especially when it comes to C-level decision making – now it appears that designers have "a seat at the table" as Kate Aronowitz, design partner at Google Ventures, writes (Aronowitz, 2018). The stake in this conversation comes with new responsibilities though: "As we shoulder new responsibilities and take bigger design leadership roles, we are falling short. I see us paying too much attention to the 'design' part of the role and not enough to 'leadership'" Aronowitz further states in her article (ibid.).

Moore's and Aronowitz's observations point out the fundamental change the designer's role is currently undergoing. While more and more people are taking part in the design conversation designers instead need to learn leading this conversation. But leading the conversation and collaborating across disciplines doesn't come naturally and requires a new vocabulary and practice, which are linked or "reconciled with the world we live in" as Moore points out in his talk (Budds, 2017).

Still, design education mostly keeps sticking to a very designer-centred model of the discipline: the autonomous expert designer as author, problem-solver or design thinker. Considering the picture of the designer drawn by Moore and Aronowitz it is questionable, if the mental model design education still considers as the goal of its curricula really relates to what appears to be quite a different picture in the professional world.

If future graduates really want to take part in the *conversation* or even *lead* it, the question raises how to break down the concept of these cross-disciplinary *conversations* to a trainable range of competences in design education. Furthermore, as design educators we should ask how to integrate these competences in our 21st century's design curricula. While redesigning our MA curriculum in design, we set out to find answers to these questions and to gather first practical experiences by integrating *conversation leading* as a mental model into our curriculum.

Our first approach was a critical review of the commonly known "T-shaped Skills Model" (Guest, 1991; Brown, 2010), where the depth of skill of a person is supplemented with the ability to collaborate across disciplines. The examination has shown that something that the T-model

doesn't consider, is the transition between the two modalities of working in disciplinary depth and working across disciplines. As a response to this gap, we propose the Y-Shaped Designer (Eckert, 2017a, 2017b), which focuses the transition from disciplinary depth towards working across disciplines and explores a range of connective competences (ibid.).

Subsequent to our preliminary research, we began mapping such connective competences and linking them to our new MA curriculum in design. More specifically, we started applying a range of conversational learning formats during our spring- and fall-term 2016/17. The most important pre-post curriculum change includes the shift from a disciplinary towards a problem-based design studio, co-teaching with multi-disciplinary faculty, context-based learning with partners from the industry and conversation-oriented teaching formats.

Aim of this paper is to give an insight into the development of the mental model of the Y-shaped Designer as Conversation Leader, which stands behind our new MA curriculum in design. Further, it reports on our first experiences made with a series of pilot schemes in conversational learning as well as our conclusion and future research on why design should undergo a fundamental shift from authorship towards Stewardship in Design.

2. Unlearning Design – Why being "T-shaped" isn't enough anymore

Most of today's design professionals learned during their studies that in order to successfully transition into the professional life, they need a strong disciplinary root, which – by making them experts – enables them to act autonomously as well as connect to other disciplines and act collaboratively. For decades, this thinking has been summarised in the so-called "T-shaped Model" (Guest, 1991; Brown, 2010). Moreover, this acting has been supported by the spread of the belief that designers can resolve anything not only because of their professional expertise but also because of their "designerly way of knowing and thinking" (comp. Cross, 2006; Lawson, 2005).

However, this way of approaching collaboration might work as long as the task or issue doesn't exceed a certain level of complexity. Or by relating to Buchanan's "Four Orders of Design" (Buchanan, 2001): this way might be enough to approach first and second order issues, but as soon as it involves interaction or the design of relationships within com-

plex systems or organisations (comp. 3rd and 4th order, ibid.) a designer – even by being the biggest expert – can't work on his or her own any more.

Yet, it is exactly this sort of complexity that we are facing today. Also known and widely discussed as "Ill-defined" (Cross, 2006) or "Wicked Problems" (Rittel & Webber, 1973; Buchanan, 1992) most of today's questions and problems unfold within a wide range of contradictory contexts, disciplines, cultures and markets. "We find ourselves in the golden age of Wicked Problems" (Eckert, 2017c) has been one of the conclusions of a recent panel discussion at the „Design in Organisations Conference" in Lucerne, Switzerland.

As a consequence of this affirmation, designers need to be aware of one crucial fact: they can't resolve today's problems by working on their own anymore. And even more fundamentally: they can't even do so by just working with other designers. Or as Mark Curtis puts it during his speech at South Summit 2017 in Madrid:

> "increasingly, design is not being done in a silo – in a design studio, where you just have pure designers thinking (and) not talking to anyone else – it's actually being done in cross-functional teams. And this is undoubtedly the way of the future." (Curtis, 2017).

A closer look to some of the recent annual reports focusing the Creative Economies reveals how concrete this future really is and how the current reality in the Creative Economies already began to shape the figure of future designers:

- In their 2016 report on the Swiss Creative Economy, Weckerle et al. describe the "Embedded Creative" as a figure, who primarily works in a non-design context (Weckerle et al., 2016, p. 65). According to the same report already today, 50% of Swiss creatives work as so-called "Embedded Creatives" (ibid.)
- "The Future of Jobs" – a research published by the World Economic Forum in 2016 states that "the combination of arts and science skills within businesses (is) a key feature of many parts of the Creative Industries" (World Economic Forum, 2016). A fact which is further linked to "6% higher employment growth and 8% higher sales growth." (Balzagette, 2017, p.42)
- The 2017 "AIGA Designers 2025 "report discusses today's design problems that "are increasingly situated within larger systems

characterised by interdependent relationships" (AIGA Design Educators Community, 2017). These Relationships "are physical, psychological, social, cultural, technological, and economic in their effects, (and) require interdisciplinary expertise" (ibid.).

- The U.S. Bureau of Labour Statistics, predicts only a 0–1% growth in traditional graphic design positions versus 27% in network communication between 2014 and 2024 (AIGA Design Educators Community, 2017). Similar numbers are currently being discussed amongst European reports, too.
- In its 2016 report on Creative Economies and Innovation, the German Federal Ministry for Economic Affairs and Energy predicts Design the highest growth potential in cross-sector innovation and names collaboration and cooperation as two main factors, which might foster this sort of innovation in the Creative Industries (Bundesministerium für Wirtschaft und Energie, 2016, p. 4)
- Facing the 9th European Horizon 2020 Framework Programme, 20% of the related Position Papers analysed by the "Swiss Core Office for European Research, Innovation and Education" specifically mention the importance of design as driver for innovation and catalyst for social innovation (Swiss Core, 2017).

While redeveloping our MA curriculum in design, we critically examined these reports and more specifically the concepts and mental models standing behind them. Most of these concepts do not relate to the commonly known *T-Shaped Model* anymore. And by taking a closer look to the *T-shape*, our conclusion was, that clearly there is a missing link between having a "depth of skill" and "collaboration across disciplines" (Guest, 1991; Brown, 2010). As soon as designers need to step out of the "silo" (Curtis, 2017) and collaborate within or even lead cross-disciplinary teams, they must acquire additional competences. Competences that enable them to listen, analyse, facilitate and lead dialogues across different disciplines and sectors of innovation. We therefore *zoomed* into the junction of the T-shape and added a connecting piece, which we call the *Y-shape* (Fig.1).

Within this *connecting piece* or *area*, a new field of competences unfolds: "connective competences" (Eckert, 2017a, 2017b), which enable designers to collaborate and more importantly *lead the conversation* across disciplines that primarily don't belong to the design domain. Machine learning designer Caroline Sinders points out what it might mean to be a *Y-shaped Designer* in the future:

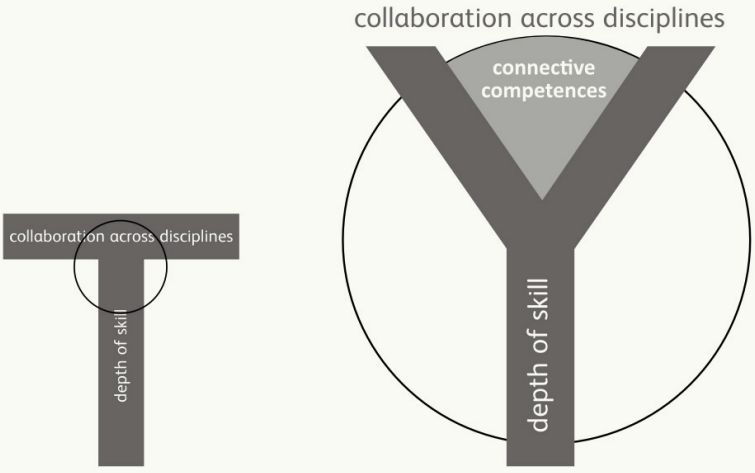


Figure 1. Extending the T-shape to the Y-Shaped Designer. Eckert, 2017a, 2017b, 2018

> "The future is less of a T-shaped designer, but a designer that's a Jill-of-all-trades. You should have an aesthetic eye, but you need to be a systems designer when dealing with AI, you need to be a designer that focuses on ethics or (as) an ethicist, you need to have a little bit of a technical understanding. And you need to be highly data-minded and data-questioning." (Sinders in Schwab, 2017).

As a consequence of these observations one thing, which is about to change drastically, is the self-perceived role of the designer. Whereas most of today's design professionals still see themselves as authors of their design outcomes, the depicted future in the *Y-shaped* approach clearly differs from such a perception. The *Y-shaped Designer* becomes more of a "broker", "catalyst" or "facilitator" (Eckert, 2017b) than the *author* of design interventions. But first and foremost, *Y-shaped Designers* need to evolve from problem-solvers to problem-identifiers (Frascara, 2002; Author 2009), who – thanks to their connectivity – become "active agents in the identification of problems." (Frascara & Winkler, 2008, p. 5). The latter makes clear: designers need to be a step ahead in order to become involved or even lead the conversation. For this reason, in this paper, I will use the term *Conversation Leader* in order to better describe the mental model of the *Y-Shaped Designer*.

Yet, whichever term we use or prefer, the fact is that as designers we are facing a paradigm at whose centre we have to put ourselves – or better the mental model of ourselves as designers. This of course takes a lot of re-thinking and unlearning how to learn to become a designer. While in the professional field, technology and its speed of driving change and innovation steadily pushes designers to rethink and adopt their professional acting, in design education instead, these driving forces mostly arrive with a delay. Which is the reason, that most schools and universities still stick to a very disciplinary or *T-shaped* model of the designer.

When we first started introducing some of the didactical approaches related to the *Y-shape* at our MA Programme in design, most of the time, we spent *unlearning* what students have learned before enrolling in our programme. Many of them first were disappointed that in our re-visited programme it appeared not being that much about themselves and their own work but much more about identifying the people they need to work with. Some of the students even got afraid they might need to forget about all the precious skills and competences they had acquired during their undergraduate studies. As an answer to this fear there is probably no better response, than Mark Bonchek's statement on unlearning:

> "Unlearning is not about forgetting. It's about the ability to choose an alternative mental model or paradigm. When we learn, we add new skills or knowledge to what we already know. When we unlearn, we step outside the mental model in order to choose a different one." (Bonchek, 2016).

3. Being connective by becoming "undisciplinary".

As a first step towards changing the mental model behind our future MA curriculum, we analysed the different curricula taught at BA level at our department in Arts and Design. In fact, all of them were following a pure disciplinary approach by being divided into traditional BA programmes (such as e.g. Graphic Design, product design or similar) that were pursuing a disciplinary set of competences and learning goals. On Master's level instead, our MA programme in Design used to offer one common programme which again was subdivided into the same different disciplines. Consequently, students coming from one discipline would enrol with the same or similar discipline and study e.g. product design all over again while aiming at becoming an even more skilled product designer –

or in other words: to deepen the disciplinary root instead of transition into a collaborative mode.

In order to face this gap between the clear shift in the design profession and what still used to be taught in our programmes, we organised a series of workshops together with faculty from both Bachelor's and Master's programmes. During these workshops course-leaders and lecturers were asked to identify different competences related to their programs. In a secondary step, a list of the most important learning goals has been elaborated by distributing these goals over both BA and MA curricula (Table 1).

Learning Goals on BA Level	Learning Goals on MA Level
Professional qualification	Self-determined learning
Discipline-driven skills	Project-driven learning
Acquiring depth of skill	Collaborative acting
Responding to a client's brief	Self-management
Enrol with a creative profession	Wide range of methods
	Ethical awareness
	Leadership skills
	Purpose-oriented acting
	Embed into different markets and domains (also other than design)

Table 1. Learning Goals assigned to BA and MA level.

This first insight showed that on the one hand most of the faculty perfectly realised the ongoing shift in the design profession, on the other instead, our curricula haven't yet been adopted to this shift. For us, this was a clear indicator that while our BA programmes might keep their disciplinary approach, our MA Curriculum in design had to aim at *unlearning* the disciplinary in a way students get the chance to transition into the collaborative mode that is being requested in the professional field.

In order to get an understanding how to *unlearn* the disciplinary, we reached out to better understand the exact opposite: the *undisciplinary*. Design educators Craig Bremner and Paul Rodgers pick up Marshall and Bleecker's concept of "undisciplinarity" (Marshall & Bleecker, 2010; Bremner & Rodgers, 2013) and put it into an evolutionary order reaching from "disciplinarity" to "undisciplinarity" (Bremner & Rodgers, 2013, p.11–12). As key factor of this evolution, Bremner and Rodgers amongst others (comp. Heppell, 2006) name "problem- or issue-based learning" (Bremner & Rodgers, 2013, p.11–12). Consequently, we decided that next

to our mental model of the *Y-shaped Designer* as *Conversation Leader,* our principal pre–post curriculum change had to include the shift from a disciplinary towards a problem–based design studio (Table 2).

4. Connective Competences – first experiences made

In order to bring the mental model of the *Conversation Leader* to the classroom, we started reaching out for a more concrete description of the *connective competences* represented in the *Y–shaped model*. We did so, by introducing three new learning formats, which are exposed in the following subsections of this paper. At the centre of these formats stand competences that are aiming at connecting learners, educators and partners from the industry by providing a base for a cross-disciplinary conversation*:*

- Handling a wide range of different opinions expressed by both designers and non-designers.
- Evaluating these opinions and creating a common ground and vocabulary for discussion.
- Leading and facilitating a cross-disciplinary discussion amongst learners, educators and partners form the industry.
- Identifying areas of friction and leverage points which might be the starting point for a design intervention.
- Critically analysing these areas of friction from multiple point of views.
- Choosing from a wide range of methods in order to define an appropriate and participatory and/or human-centred process.
- Leading a participatory and/or human-centred design process.
- Implementing design interventions (in non-design contexts).
- Foreseeing, evaluating and controlling the impact of the design process and intervention in ethical, social, economic, ecological and technological terms.

From a didactical point of view, the competences and our three new formats relate to Kaiser's concept of "situative skills" and "concrete competences" (Kaiser, 2005, 2011). His concept states that most learning goals and competences should relate the closest possible to real-world situations encountered by the students in the professional world after graduating (e.g.: facilitating a cross-disciplinary discussion amongst different stakeholders). In order to foster such situations, that provide "learning

Didactical Aspect	PRE-curriculum	POST-curriculum
Project- and Issue-based learning	Disciplinary learning-track (e.g. graphic design) and disciplinary studio-work.	Project- and issue-based design studio. Taught by multidisciplinary faculty.
Collaborative learning	Individual project-work and studio-coaching.	Collaborative project-work and group-coaching in the design studio.
Context-based learning, scaffolding	One disciplinary project; often approached from a design-only point of view.	An initial series (1st semester) of brief interdisciplinary projects in collaboration with external partners shifts the attention to the real-world context.
Self-determined learning and micro teaching	Students can choose between a variety of courses and pick one personal subject for their project.	Students get involved into the organization of student-led courses, alumni lessons and focus groups. Subjects and projects get discussed collectively by both, learners and educators.
Competence-oriented learning and self-evaluation	Students get evaluated and graded by a set of criteria.	Students start evaluating themselves with a competence-matrix. Based upon this evaluation a learning-agreement is made after the 2nd semester. This agreement is part of the final evaluation and grading as well as the base for an individual coaching to achieve the established learning-goals.
External referencing systems	Students develop their MA project in the design studio and mainly get taught and evaluated by the program's own faculty.	During the 1st semester, short-projects are held together with external partners and companies. During semester 2 and 3, students set up partnerships for their own project and work at the partner's or company's site.
Learning that traverses institutional boundaries across different sites of expression	Students mainly work in the studio and the university's different labs.	The studio and the lab (newly collocated on the same floor) merge together. Project-weeks held at companies' sites and collaborations with external partners extend the studio into a real-world lab.

Table 2. PRE–POST–Curriculum change, Author 2017

(that) traverses institutional boundaries" (Jewitt, 2008, p. 242) during fall 2016, we launched a series of pilot schemes combining the traditional design studio with the participation of external partners such as e.g. companies, public entities or external experts. The following subsections dive into three of these experiences made, each one of them based upon a specific collaboration with an external company, entity or organisation.

4.1 Weekly conversation training – "Atelier Day"

While before, in our design studio students would split up into their disciplinary groups and being followed by one or two teachers, we now decided to gather all students and faculty together in order to collaboratively focus on project-based questions. We did so by introducing a weekly *Atelier Day*. A day, where all students and teachers from our programme would meet together in the morning and decide based upon subjects and matters which groups would work together for the rest of the day.

As hard as it initially appeared for organisational reasons, as astonishing was the range of possibilities to explore and train the *conversational mode* we were aiming at. After the first week, students took over most of the conversation by bringing in different subjects, organising micro-learning sessions (Hattie, 2013, p. 134ff), workshops or lunch cooking sessions. Especially, the high level of self-management showed by the students came as an evidence that it was worth opening up the studio in order to turn it into an open platform for discussion between learners and educators coming from different backgrounds.

In order to even emphasize this openness, we started inviting external guests such as e.g. experts from a specific field that we were discussing in a project. This way, the conversation got enriched with an external point of view and besides reflecting their work from multiple design angles, students now also had the opportunity to blend in perspectives from disciplines outside of the design domain. A fact that relates a lot to the described shift in the professional field, where designers more and more *embed* into sectors that don't necessarily belong to the design domain itself.

4.2 Re-briefing the brief – "Sprint Projects"

As a second format, in fall 2016, we introduced so-called *Sprint Projects* – projects that include a primary brief by an external partner (e.g. com-

pany or organisation), which then gets re-briefed and critically analysed by a group of students during a period of approx. 2.5 months. Aim of this format is to push students into the role of the *conversation leader*, who basically has to re-think a problem or task from a design point of view while connecting to the wide range of opinions represented by the different stakeholders.

Our latest *Sprint Project* took place in fall 2017 together with the Zürich-based firm *Medignition*, who engages in the field of healthcare innovation. Starting point of the project was a method developed by the company, which was aiming at the self-diagnosis of vision impairment via mobile devices such as e.g. smartphones. Initially, the company's brief was to re-imagine this technology in order to provide a mobile-based alcohol-test addressing party-people. After a while and a series of conversations instead, the students came up with the proof, that according to statistics, in Switzerland most people use public transport or taxis after a night out or decide on somebody who doesn't drink and drives the others home. After a subsequent study, our students found out that due to its popularity as recreational sport, there was a much larger potential in preventing people having accidents related to alcohol consumption while skiing than partying.

Our student's re-brief of the initial project idea is a perfect example of how designers might take over the conversation when trained to critically analyse a situation or issue and re-frame it from multiple points of view. After their re-brief, our students conducted a more precise analysis based on statistics, interviews and surveys in order to develop a first series of wireframe prototypes of the future application, which is now further developed to track the alcohol consumption and its relation to the performance of recreationists in Swiss ski resorts.

4.3 Changing points of view – "Project Week"

A third example of how we started shifting the focus of our curriculum towards the designer as *Conversation Leader* is our *Project Week*. During the first week of their master studies, students get exposed to a brief provided by an external partner or company. Last fall, this project was led together with *Küng Sauna* – the Swiss market-leader in private saunas and spas. This time, the brief wasn't to improve the company's products but step into the company's shoes and think how to transfer their expertise to a different sector in order to open up new markets. In *Küng Sauna's*

case, students had to evaluate the company's potential in improving people's well-being while working in office spaces. For seven days, students were asked to conduct a preliminary research on health and well-being in offices in order to identify leverage points where the sauna company could develop new products or services aiming at the health and well-being of today's office workers.

Subdivided into four interdisciplinary groups, students from different design backgrounds discussed ideas around indoor air quality, light quality and temperature in office buildings or the fact that today's knowledge workers lack movement during office hours. The research became a real quest for design interventions and the students finally discussed four different areas with the company in order to develop and place new products or services.

This last example illustrates the shift from thinking in solutions towards identifying areas of friction and potentials for future design interventions. All in all, we realised that no matter what subject, the fact that thanks to these three first attempts to move away from disciplinary learning, students acquired a lot more responsibility and control over their personal learning process. The discussion shifted from "being a better designer" to "shape my own role as a designer". Even if students weren't aware of our mental model behind the new learning formats, they perfectly realised that the learning focus had shifted and that they found themselves in a more self-governed position when re-briefing or briefing themselves – a fact that led to an overall higher engagement of students and a much more autonomous position when discussing the projects with our partners from the industry. Overall, our design studio turned from a disciplinary and mostly design-led discussion to a problem-based platform for cross-disciplinary and reciprocal learning between young designers, educators and practitioners.

5. From authorship to Stewardship in Design

Besides being a first success in bringing multi-disciplinary learners and educators together, the three examples of provoking problem-based conversations in our MA curriculum also led to another conclusion: while before, our students mostly were encouraged to position themselves as authors of their personal design work, thanks to these new learning experiences the attention shifted towards becoming leaders in identifying design opportunities by taking responsibility for a certain group of

people, a new context, a social or technological issue or simply by stepping out of the designer's shoes and taking an entirely new perspective.

We therefore, started arguing the term *authorship in design* (a discussion which will not further be exposed in this paper) and came across the term *stewardship*. After our fist experiences made with the mental model of the designer as C*onversation Leader,* the concept of *stewardship* perfectly relates to what has been discussed in the second section of this paper: actively identifying problems and taking responsibility for the identified issues. An important reference to this discussion is the latest report of the AIGA Design Educators Community (DEC) which projects designer's professional roles into the year 2025 (AIGA Design Educators Community, 2017). Emily Gosling, who is a senior editor at *AIGA – Eye on Design*, takes a closer look at the "AIGA Designer 2025" report (ibid.) and draws the conclusion that:

> "design students of the present and future need to be able to both deftly negotiate the concerns of various stakeholders within projects and also evaluate their work in terms of its potential social, cultural, technological, economic and environmental impact. What that essentially boils down to is accountability: designers now more than ever need to justify their research and outcomes" (Gosling, 2017).

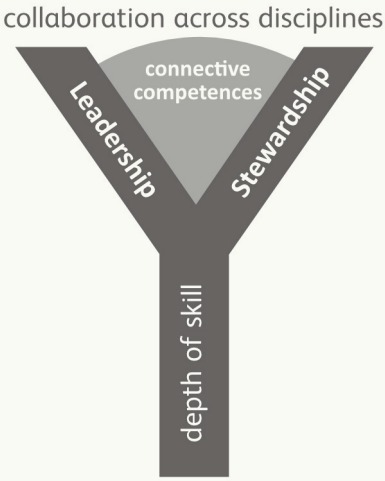


Figure 2. Leadership and Stewardship as two main aspects of the Y-shaped Designer, Eckert, 2018.

Being accountable for something also means to care and to take responsibility for it. For designers whose discipline is extending into various fields of the knowledge society this signifies that besides *leading the conversation* they must become *stewards* of the people and the context they design for. Based upon this insight, in this paper I would like to refine the model of *Y-shaped Designer* by adding two aspects in between which *connective competences* unfold: *Leadership* and *Stewardship in Design* (Fig. 2).

6. Conclusion. Ten principles of Stewardship in Design.

On a practical level, the final insight on *Stewardship in Design* extends the mental model of the *Y-shaped Designer* and *Conversation Leader* into aspects of ethics, social responsibility, ecological and economic awareness as well as the foresight and control of the impact a design intervention might unfold in a certain context. Furthermore, it asks for the inclusion of such topics as well as leadership skills in design education. A definition of *Stewardship in Design* therefore represents a future step for the further development of our curriculum in design.

Yet, a first attempt of what might be 10 core competences or aspects of *Stewardship in Design* shall be exposed at the end of this paper in order to draw a first conclusion from the research and experiences shared so far as well as open it up towards future discussion amongst learners, educators and professionals. The following "Ten principles of Stewardship in Design" represent a summary of the reviewed literature, the workshops held with our faculty at Lucerne University of Applied Sciences and Arts and our first experiences made while implementing our new MA curriculum in design. Amongst the different reviewed papers during this process, the "AIGA Designer 2025" report (AIGA Design Educators Community, 2017) gave a mentionable cut to the following *Ten principles of Stewardship in Design:*

1. Ethical and cultural awareness: designers are ethically aware that at the core of their work stands the relationship between any design intervention and its impact on the human being, cultures and the ecosystem we live in.
2. Identifying problems & Framing Projects: Designers actively identify areas of friction and leverage points as starting points for design interventions, which may unfold in value and huge impact.

3. Agility: Designers embrace the openness and unfinishedness of their intervention and artefacts in order to make them adaptive design solutions ready for a continuous updating.
4. Data literacy and De-Computation: Designers are aware of the rise of data-driven processes and are able to relate to these processes as “actors of de-computation” in order to turn them into benefits for the human society and the world it lives in.
5. Research culture: Designers are able to embed their work into a culture of research and documentation in order to be accountable for their work and making their acting as transparent as possible towards the community.
6. Methodology: Designers master a wide range of processes and methods. They therefore are able to match a design process with the right methodology.
7. Leadership: Designers acquire leadership skills in order to lead cross-disciplinary conversations and projects. They adopt their leadership style to the stakeholder ecosystem they work in.
8. Facilitate: Designers act as facilitators and translators across disciplines, media, cultures, economies and technologies.
9. Empathy & Inclusion: As conversation leaders, designers are responsible for the active inclusion of all necessary participants of a design process.
10. Foresight and evaluation: Designers are able to anticipate, evaluate and control the impact of their interventions in relationship to the human being, culture, society, economy and the ecosystem we live in.

Jan Eckert
Head – Master’s Programme in Design,
Lucerne University of Applied Sciences and Art,
jan.eckert@hslu.ch

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EGALI Language and Visual Accommodation in Reactive Digital Signage

Karl Engebretson

Abstract

When language is displayed on signage it does not provide all readers with equal access to what is being communicated. Those with different reading or language requirements are often excluded from understanding the content.

Signage is experiencing a shift from physical and static applications to digital displays of information. Yet, the inherently flexible medium of digital signage often treats content in a manner that is inflexible and unresponsive to the needs of the user. Digital signage can, and should, adapt its messaging to the reading requirements that best suit each reader.

This paper outlines the development of a typeface family and a digital signage prototype, each addressing different issues of accessibility. The two components work together as a flexible system of support that provides messages to the reader in the format they prefer or require.

The typeface, Egali, is designed to provide quick legibility and features dynamic letter construction that establishes word and sentence relationships to encourage the flow of reading in multiple Western scripts. The typeface also includes options that modify letter construction and spacing to address specific visual or cognitive reading issues. These details of accessibility are provided on axes; which allow users to define the level of support they deem appropriate.

The digital signage prototype provides layers of content tuned to the reader's preferences. An easy initial scan loads content in the language and reading accommodation desired. Additional information is accessed by the user when physical proximity to the screen changes. This hands-free and intuitive interaction allows for a great depth of content to be explored in a small space by users with a wide range of technological proficiency, language fluencies, and visual abilities.

This speculative typeface and prototype project serve to demonstrate a universal design environment where there is no priority for one written language over another. Content tuned to the preferences of each individual provides equal access to the information on public display. By enabling easy reading accommodation in the outward display of digital signage, the us and other dynamic is mitigated and allows for a shared interactive experience with the content.

Theme: Language
Keywords: typographic legibility, visual accommodation, language accommodation, typeface design, digital signage

1. Introduction

Ideas presented as words, in any format, allows concepts to be transferred in a passive, but durable manner. Written communication is immutably shifting from static, physical application to the digital display of words, but digital text is often applied in fixed and rigid ways. Digital screens display what they are instructed to, but the screen's inherent flexibility is not being co-opted for greater benefit.

This egalitarian design endeavor centers around this statement that served as the genesis of the inquiry, "Multi-lingual signage is more than having multiple languages on a sign." (Dr. Tasoulla Hadjiyanni, personal communication, 11/14/2014). Extending the concept further, how can those who read differently be included in the designscape that they inhabit? Inclusivity in a digital world demands more than the simple incorporation of more options. Rather, accommodation should be possible while maintaining an overall design aesthetic. Individuals vary in what their needs are and the inherent flexibility of digital tools provides the capability of reactive systems that allow natural, adaptive design experiences.

1.1. Design Landscape

The broad adoption of the Internet as a public communication tool has significantly shifted how information is accessed and consumed by just about everyone. Personal electronic devices can provide users with language accommodation and other supports to meet individual needs. However, there is a shift underway, in which personal technology extends outward into a broader, interactive, and digital world. Signage from billboards to wayfinding is shifting to being digital displays. This allows for greater flexibility in the content and variety to be displayed. This presents an opportunity to develop communication practices that more precisely accommodate its readers.

Accommodation means very different things to different types of readers. The language in use, age of the reader, writing skill and cognitive function can all influence an individual's ability to decode written text. How legible or readable a text is can be influenced both by the typeface

designer as well as the graphic designer of the final composition. Access to a message depends on the environment of typography an individual inhabits, both personally on a smart device and externally on the signage that surrounds them.

1.2 The Reading Process

The predominant model for how human brains process words and text is the parallel letter recognition model. Psychologists have found that the letters within a word are simultaneously recognized and processed as a unit. (Beier, 2012). “When we read, we perceive that our eyes move smoothly across the line of text, but they actually are making jumps from word to word – fixating on a word for 250 to 300 ms, then making a quick movement to the next” (Larson, 2007). This skipping of the eyes is called saccades and utilizes the most receptive area of the eye called the fovea (Beier, 2009). Defining letter characteristics tend to gather around the top level of most lowercase letters (x, n, o, e.g.), commonly referred to as the x-height. A demonstration of this universal legibility area in Latin-based scripts can be observed when a text maintains its ability to be read if the top half of letters are present and the bottom half are obscured (Tinker, 1963); see Figure 1.

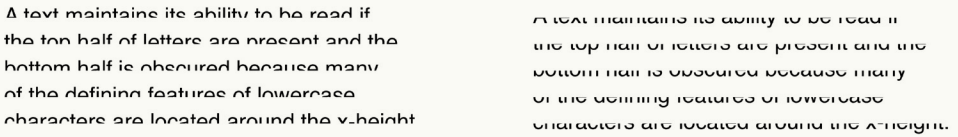


Figure 1. Letter reconginition is focused around the x-height. Text Set in Helvetica regular.

1.3 Welcomeness

Graphic design contributes nuance to visible language akin to utilizing tone of voice to provide greater contextual clarity when speaking. In their paper, “Graphic Assimilation: New Immigrants and Social Identity,” Martinson and Chu (2003) found that perceptions of quality, class, or community that graphic design can imply through aesthetic choices directly relate to the held identities of its intended audiences. If a piece of design is of perceived high quality compared to the other design ephemera, its target group establishes a higher value upon themselves in the context of

the mix of groups composing the surrounding community; if the design is of poor value, a reduction in a group's comparative value can occur (Martinson & Chu, 2003). If perceived quality of higher design can reach disparate groups, their collective perceived values can all be raised.

In a previous research project, "Traversing the Concourse: Navigating in an Environment Without Your Native Language" (Engebretson, 2016), I interviewed international graduate students about their travel experiences coming to live and study in the United States. Their accounts of being immersed in a foreign language environment – even though some were partially or fully fluent in English – provided the suggestion that native language support is most beneficial when the vocabulary is complex (hospitals and educational institutions, e.g.). Airports and similar institutions are navigable without strong language fluency because the concepts they are communicating through their signage are simple and assisted by iconography and directional symbols. This exposes a gap in the current approach to multi-lingual signage: language inclusion aids in clarity and also communicates an atmosphere of welcomeness.

The students' accounts also implied that the absence of one's native language in the landscape of daily life creates a sense of alienation. One participant recalled excitement at actually finding a sign in Arabic (their native language) and how it immediately stirred a sense of Arabic-language identity.

1.4 Problem Statement

How can a typeface and digital signage be developed so users are met with their preferred format for reading?

1.5 Approach

This comprehensive inquiry explores how a broader range of readers can be supported through the development of a typeface delivered through a customizable digital signage prototype. The typeface, *Egali*, has been crafted to promote quick legibility and readability by designing letterforms that redirect the reader's focus back to the areas where letter/word recognition primarily occur. The typeface also includes support for languages that utilize Latin and/or Cyrillic characters to exemplify language flexibility – beyond the use of diacritical marks. Variations of *Egali* were also designed with letterform modifications that encourage letter/word

recognition in readers with distorted vision (myopia, e.g.) or the cognitive reading difficulties imposed by dyslexia – allowing multi-modal support for the specific needs of readers.

The goal of the *Egali* typeface and Reactive Digital Signage (RDS) is to provide an inclusive signage experience removing any prominence to a particular language or user type. The content appears with the same design consideration for all, equating to a perception of equal value. The ability for greater depth of content is also a key factor. Digital screens provide a portal to more information as long as their system is designed to provide it.

2. Egali Typeface Design Methodology

Three areas of typographic knowledge informed the design of the *Egali* typeface to promote ease of reading for different types of users:

- General legibility and readability principles of letterform design coordinated to form letters that most readers can easily and quickly discern.
- Typefaces that have been designed to promote reading in populations with visual or cognitive differences posit departures from common typographic practice to assist the special visual requirements of readers with different needs.
- The conceptual and functional definition of a typeface is explored and expanded upon to establish a more flexible concept of lettering that provides scalable support.

2.1 Egali Letterform Design

Legibility is defined as the recognizable differences from one letter to another; thus increasing the characteristics that provide uniqueness to a letter can provide more details to aid in discernment of a word. In *While You Were Reading*, Gerard Unger (2007) has efficiently summarized Walter Tracy's concepts concerning the definitions of legibility and readability:

> *"Legibility* refers to the ease with which letters can be distinguished from one another: whether, for example, there is a sufficient difference between capital *I* and lowercase *i*. According to Tracy, *Readability* is a broader term that refers to comfort: if you can read a newspaper for a long stretch of time it is readable. In other words,

> *legibility* refers to letterforms and their details whereas *readability* refers to a broader picture (p. 20)."

The width ratios of letterforms in *Egali* are slightly wide compared to other fonts and typefaces designed for reading long passages of text. When width of letterforms is isolated in studies, it has revealed that wider letterforms are more legible than narrower letterforms (Beier & Larson, 2010). This allows the unique characteristics of each letter, including the white spaces surrounding them, to be more noticeable as a result.

Using the Gestalt Laws of proximity, continuity, and closure (Friškovec & Gabrijelčič, 2010) to shape the letterforms, *Egali's* glyphs are drawn with dynamic terminals to encourage letter interactions that guide the reader's eyes along the text and return their focus back to the x-height. *Egali's* design contradicts the Gestalt Law of closure by minimizing letter strokes that point in towards the letter they are a part of (Figure 2). This dynamic construction co-opts the natural tendency to group items, the Gestalt Law of proximity, and as a result creates words that are easily formed. By keeping the reader's focal area on the prime region of letter/word recognition, the x-height, it is quicker and easier to discern the words, increasing readability.



Figure 2. Dynamic letterform construction.

Egali's most significant design detail can be found in the countershapes of lowercase letters (Figure 3). The counters of a, c, d, g, h, m, n, q, r, s utilize a sharpness in their top-right corners closest to the x-height to establish a visual directionality. The Gestalt Law of continuity defines the predilection for visual focus to be directed along an actual or implied line or curve (Friškovec & Gabrijelčič, 2010). The almost 90° corner of *Egali's* lowercase countershapes creates strong directionality that the reader's eye naturally follows up and right to align with the implied line of the x-height. This concept attempts to builds off of the W.A. Dwiggins M-formula (Beier, 2009), a time-tested approach to letter design where curved strokes in letterforms are designed with sharper corners of the interior counter spaces to enhance the perceived smoothness of an exter-

nal curve – that is especially effective when viewing small text or text at a distance.

Figure 4 and Figure 5 illustrate a variety of other influential design details that direct the reader's eye back to the x-height. The vertical stems of lowercase *Egali* letterforms utilize a 45° clipping (Figure 5-A) of their right facing top corners that provide a slope to assist the eye's flow back to the x-height. The tittle (dot) of the i and j (Figure 5-B) have three faceted corners and a fourth, the bottom-right, has a 90° point which leads the eye downward toward the x-height area. The 45° clipping of strokes appears elsewhere in the letterforms (Figure 5-C). The vertical strokes of capital letters utilize a subtle faceting on the stems to assist in the redirection of the eye to the x-height as well (Figure 5-D).



Figure 3. Leading interior corners of Egali.



Figure 4. Leading the eye with Egali type features



Figure 5. Egali features that redirect the reader's eye back to x-height.

2.2 Languages

This project aims to provide those who witness the *Egali* Reactive Digital Signage (RDS) a noticeable shift in language support. Letterforms were extended into the Cyrillic script to provide a recognizable change in script on display that need not be understood to be witnessed.

Egali supports languages covered under the extended Latin character set including, but not limited to: Afrikaans, Basque, Catalan, Croatian, Czech, Danish, Dutch, English, Estonian, Faeroese, Finnish, French, Galician, German, Hungarian, Icelandic, Irish, Italian, Latvian, Lithuanian, Maltese, Norwegian, Polish, Portuguese, Romani, Slovak, Slovene, Spanish, Swedish, Turkish, and Vietnamese.

The design of the basic Cyrillic character set allows for use in these languages: Bulgarian, Byelorussian, Macedonian, Russian, Serbian, and Ukrainian.

2.3 Interpolation

Computer-based typeface design often utilizes interpolation, a mathematically based vector drawing transformation process to generate additional iterations within a typeface. Once *Egali's* single core font of *Egali Regular* was completed, it was modified into two versions of different weights, *Thin* and *Black*, to provide interpolatable access to any weight variation between the two extremes. Nine weights of *Egali* were refined (Figure 6), two masters (the extremes of thin and black) as well as the seven interpolated instances between them using Glyphs (v. 2.4.1). This process was assisted by the Show Interpolations Plug-in written by Rainer Erich Scheichelbauer, which provides a live-preview of interpolated instances (https://github.com/mekkablue/ShowInterpolations). The amount of weight variance for each interpolated instance was informed by Lucas de Groot's "Theory of Interpolation" (accessed 6/20/2016).

2.4 Designing for Different Types of Readers

Developing typefaces to serve the needs of readers with special visual requirements builds off of the existing principles of legibility, readability and construction of letterforms. Depending on whom the typeface is intended to serve, letters are modified in subtle or starkly obvious ways to facilitate individual letter recognition.



Figure 6. Egali weight instances.

The two extreme versions of *Egali*, *Thin* and *Black*, became the masters for two variations of *Egali: Egali_DYS (DYS)* and *Egali_VIS (VIS)*. The letterforms of *DYS* and *VIS* have their shapes and spacing modified to assist readers with different visual requirements; *DYS* for readers with dyslexia and *VIS* for readers with visual difficulties. These two distinct designs were informed by existing typographic research and examples of published typefaces (Table 1).

Support for readers with dyslexia	Support for readers with visual impairment
Dyslexie	FS-Me
Sylexiad	APHont
Open Dyslexic	Tiresias
Lexie Readable	

Table 1. Typefaces that serve special needs.

Egali_VIS is a collection of subtle modifications to the letterforms that aid readers with distorted vision caused by conditions such as myopia or hyperopia.

- Features additional inter-letter spacing within each glyph.
- Thin, angled strokes have been modified to have a slight curvature.
- Sharp corners and stroke terminals have been rounded.
- Certain letterforms have been replaced with forms deemed more legible in the research of other typefaces.
- These modifications were based on design suggestions for layout and/or letterform design from Text Matters (2011), "The Legibility of Typefaces for Readers with Low Vision: A Research Review" (Russell-Minda, et al., 2007), and "How to measure typographic accessibility" (Rozario, 2016). Modifications to letterforms were influenced by the typeface *FS-Me*, published by Fontsmith.

Egali_DYS

- Features wider spacing to aid readers with dyslexia in identifying characters.
- Versions do not have italics as they have been shown to decrease readability for readers with dyslexia (British Dyslexia Association, 2015; Hillier, 2006; Rello & Baeza-Yates, 2013).
- The most notable adaptation is the bottom-heavy letterform shapes. There is a predilection for "...confusion of reversible letters and mirror reading and writing" (Chiarenza, et al, 2014) in readers with dyslexia. The additional weight at the bottom of letters reduces the chance of misidentification of letters, especially lowercase letters with ambiguous forms like p, d, b, q (Hillier, 2006).
- The different weights of *DYS* are nine levels of support. The thin weight is an unaltered version of *Egali Thin*, but *Egali_DYS Black* has made significant changes to each and every letterform by accentuating the uniqueness of their countershapes and applying the bottom-heaviness to the letterforms. The steps between *Egali_DYS Thin* and *Egali_DYS Black* are choices if the user prefers a little modification to aid their reading or a drastic amount.

It should be noted that research surrounding the effectiveness of fonts that support dyslexia are often conducted by their designer and have yet

to be proven significantly more effective than established fonts that follow guidelines to improve readability among readers with dyslexia (Bigelow, 2014). This font variant is untested with its intended population, but I believe it is important for the prototype to exhibit a visual shift in language accommodation for a specific need – similar to the use of Cyrillic for this project – allowing the opportunity to establish a more welcoming atmosphere.

2.5 Scale of Accessibility

Where *Egali* separates itself from the development of other typefaces is that it has commandeered interpolation to extend its design into variations that support specialized reading needs. The derivative versions are an attempt serve populations of readers with special requirements while not departing from the established design aesthetic to improve the reading experience. These two alternate versions of the typeface, *VIS* and *DYS*, provide a range of accommodation within the fonts, rather than a single and disconnect typographic solution.

The *Egali* typeface is unique in that its adaptations provide access with subtle to extreme levels depending on the user's preference. The iterative steps provided by interpolation allow the user to choose the level of support they wish to receive, by the amount of letterform alteration, while not leaving the typographic domain of *Egali* (Figure 7).

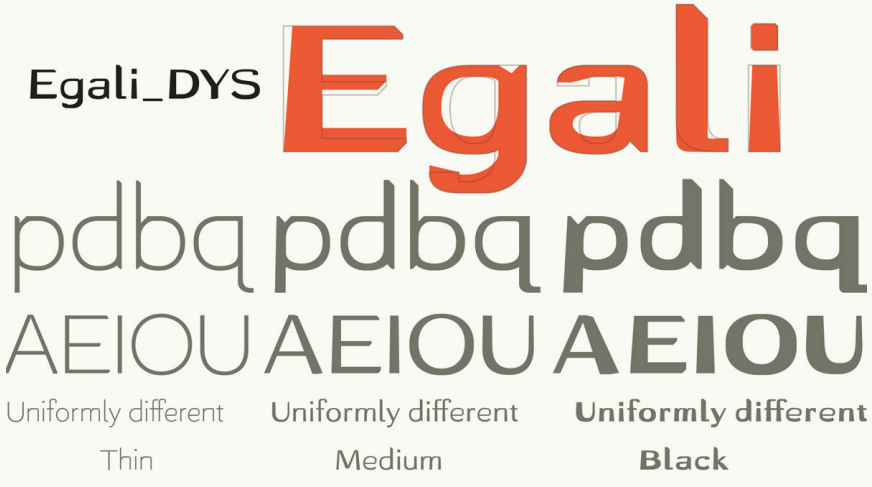


Figure 7. Egali_DYS interpolated scale of support.
Unique characteristics accentuated with heavier weights.

2.6 Typeface Specifics

This design approach yielded a full-featured typeface featuring small caps, alternate characters, opentype numeral options and an extensive variety of symbols. In totality, the *Egali* typeface is comprised of 45 separate font files (Figure 8) with a character count of approximately 700 glyphs each. This typeface was designed, interpolated and exported through the font design program Glyphs (v. 2.4.1) into OpenType formats (.otf). There are nine weights with matching italics for *Egali* and *Egali_VIS*. *Egali_DYS* does not have an italic version.

3. Egali Reactive Digital Signage Development

The *Egali* Reactive Digital Signage (RDS) provides users the experience of a supportive language environment through the easy accommodation of language and modification of text. The language source and potentially modified version of the letters are triggered by the user who is then free to interact with the content in a preferred reading format. Proximity of the user to the digital sign plays a vital role to the process, as the amount of content revealed depends on how close the user is to the digital display. This coordination of font options (within a typeface), proximity sensor and preference modification combine into an intuitive and interactive reading experience (Figure 9). The prototype was exhibited to the public at the Paul Whitney Larson Gallery at the University of Minnesota in April–May 2017.

3.1 Triggering Reading Modifications

Content for the different reading preferences was accessed through the scanning of a QR code that represented a particular user profile. For the exhibition demonstration of RDS, six user types were created (Table 2).

English reader without modification (STD)	Russian reader without modification (STD)
English for readers with visual impairment (VIS)	Russian for readers with visual impairment (VIS)
English for readers with dyslexia (DYS)	Russian for readers with dyslexia (DYS)

Table 2. Egali RDS supported User Profiles.

Egali Thin
Egali Thin Italic
Egali Extralight
Egali Extralight Italic
Egali Light
Egali Light Italic
Egali Regular
Egali Regular Italic
Egali Medium
Egali Medium Italic
Egali SemiBold
Egali SemiBold Italic
Egali Bold
Egali Bold Italic
Egali Extra Bold
Egali Extra Bold Italic
Egali Black
Egali Black Italic

Egali_VIS Thin
Egali_VIS Thin Italic
Egali_VIS Extralight
Egali_VIS Extralight Italic
Egali_VIS Light
Egali_VIS Light Italic
Egali_VIS Regular
Egali_VIS Regular Italic
Egali_VIS Medium
Egali_VIS Medium Italic
Egali_VIS SemiBold
Egali_VIS SemiBold Italic
Egali_VIS Bold
Egali_VIS Bold Italic
Egali_VIS Extra Bold
Egali_VIS Ex. Bold Italic
Egali_VIS Black
Egali_VIS Black Italic

Egali_DYS Thin
Egali_DYS Extralight
Egali_DYS Light
Egali_DYS Regular
Egali_DYS Medium
Egali_DYS SemiBold
Egali_DYS Bold
Egali_DYS Extra Bold
Egali_DYS Black

Figure 8. All Egali Font Variations

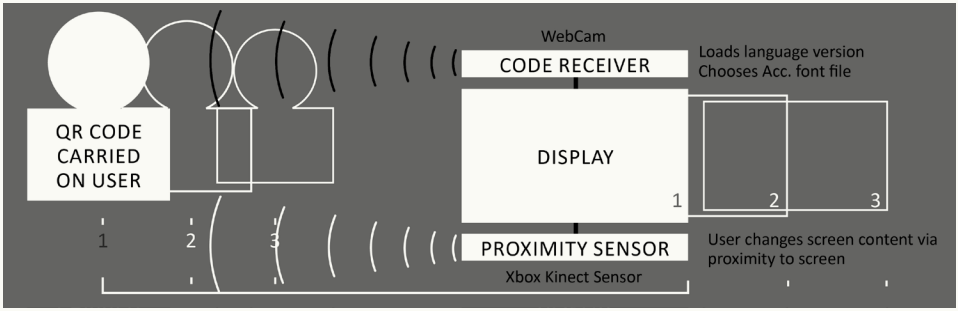


Figure 9. Egali Reactive Digital Signage (RDS) conceptual outline

A high-definition webcam read the QR codes and triggered the change in user type. The resolution of the camera, lighting at the exhibition and size of the QR placards were effective up to 12 feet away from the webcam and screen assembly.

3.2 Proximity

At the core of the interactive component of RDS is the proximity sensor of the Xbox Kinect v.1414 sensor. It provided precise proximity data that allowed the digital signage to reveal different content related to the user's distance away from the display (Figure 10). Scanning the QR code loaded content from a particular file tree for each different user type. The display

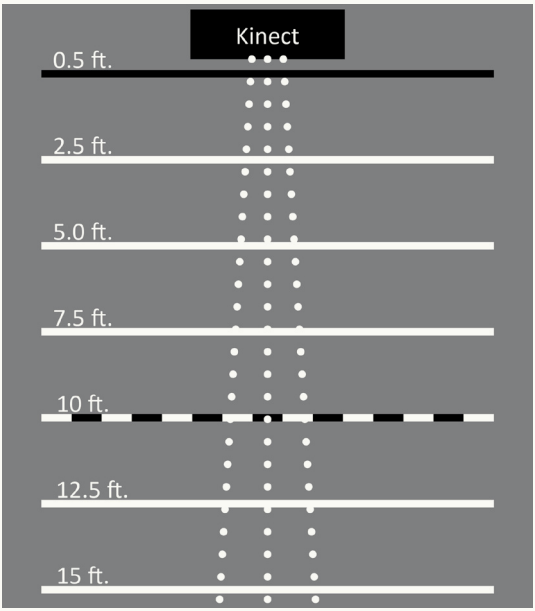


Figure 10. Kinect sensor depth scanning and depth stages.

of content was tied to a particular proximity range and the three containers of the UI access images tied to proximity levels independently.

The Xbox Kinect sensor provided a constant stream of proximity data by monitoring three tangents for object presence and then averaging their readings (Figure 10). When the proximity reading fell within a specified range the display of the appropriate graphic from within a specific user's content (Russian reader with dyslexia, e.g.) was displayed. Content was stored on the local computer and connected directly to the digital display. The organizational design was identical, down to the naming of the files. Identical images or animations were duplicated into the same locations for all six user profiles.

3.3 Hardware

Egali RDS was designed to work in a Mac OS Sierra environment utilizing:

- Xbox Kinect sensor v.1414
- A4Tech 1080P Full-HD WebCam
- iMac 2012 w/ Apple Extended USB keyboard
- Sharp PN-L603W 60" interactive display

3.4 Software

The application development program QT was used to coordinate the four C++ processes and export the final visual product to the screen. QT allowed for multiple simultaneous operations to modify the content on the digital display. Four C++ programs were written, compiled or modified from other existing code to work together in the QT program environment.

- depthdetectorthread.cpp
- EgaliSignage.cpp
- main.cpp
- qrreaderthread.cpp

The Kinect exported proximity data in C++ only which forced some hardware and software decisions. Newer versions of the Kinect (2.0, e.g.) were tested, but a solution to gain access to their proximity data was not found in a Mac OS environment.

The specific LIB and API packages necessary for *Egali* RDS to function can be found with detailed installation instructions here: https://github.com/xiziwang/Egali-Reactive-Digital-Signage.

3.5 Prototype of Supportive Language Environment

This egalitarian approach to digital signage typography offered its users a glimpse at a universal design environment where they are met with messages and concepts in the format that allows them to best intake complex information. By supporting both a wide range of languages and adapted letterforms, the *Egali* RDS broadcasts a flat hierarchy of information giving no prominence to any individual language or reading ability. By building support into the typeface, legibility for readers of all visual and cognitive abilities are served information equally – applying equal design value to each individual.

The *Egali* RDS prototype was developed by freelance coder and programmer Xizi (Lucy) Wang. Technical details and access to the same software and instructions to duplicate the project are archived on GitHub: https://github.com/xiziwang/Egali-Reactive-Digital-Signage.

4. Extension

This prototype achieved its goal of exhibiting a working, adaptive, and supportive language system. However, the choices made for using certain technologies were dictated by the timeframe, familiarity, and budget of

the project. Ideal solutions were not always explored, but rather an attempt to achieve the best functionality through the components available.

4.1 Changing User Types

The QR code reading function worked well in the exhibition environment to switch user types. However, the amount of data processing necessary for the digital reading of a QR code through the webcam seemed exorbitant compared to the amount of information that needed to be transferred. Preferences communicated through more efficient technologies, such as near-field channel (NFC) and radio-frequency identification (RFID), would better communicate the very concise amount of data to a reading mechanism for switching user types. In broader application, RFID markers could be included as part of common documents such as identification cards, passports, or driver's licenses and NFC communication could transmit from a smartphone to a reading mechanism.

4.2 Proximity Sensor Improvement

The Xbox Kinect used as a proximity sensor was a great tool for providing interactivity to the content of the signage. However, the Kinect provided data in C++ format which resulted in a limited ability to choose compatible software or tools. The Kinect was overpowered when *Egali* RDS only needed the depth measurement of a user. Alternatively, a more complex system that could track multiple users and language preferences in a larger space/setting would capitalize on the rich data the Kinect or similar sensor can provide (Figure 11).

4.3 Parallax/HTML/CSS

The visual formatting of *Egali* RDS content was based off of the engaging design of websites with parallax functionality. Instead of simulating the benefits of this existing technology, future developments of *Egali* RDS would incorporate parallax functionality. The user's proximity reading could be tied to page location of a parallax enabled webpage. Relying on HTML and CSS as the primary design framework would allow for broad application and experimentation of RDS conceptual functionality as there are so many practitioners fluent in these coding applications. The following list provides websites that were used as direct references for this project:

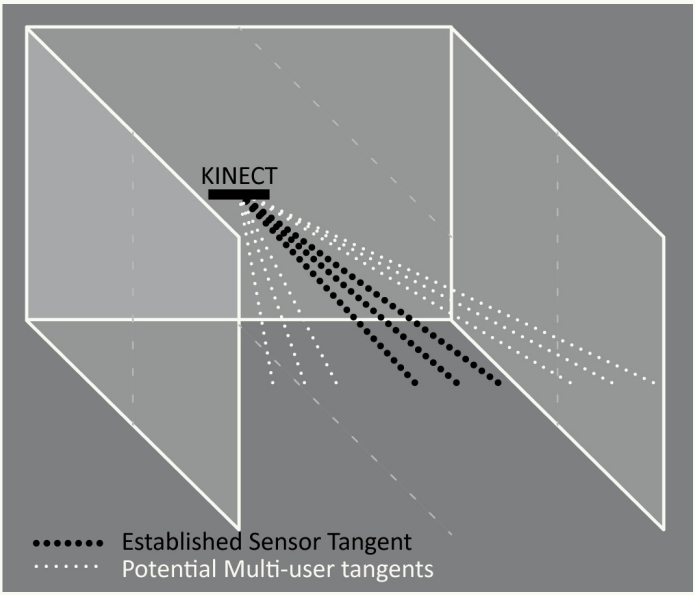


Figure 11. Established and Potential Proximity sensor Areas of Focus with Xbox Kinect sensor

- myriad.space/
- www.culturalsolutions.co.uk/
- jessandruss.us/
- www.bbc.co.uk/news/special/2014/newsspec_7617/index.html

4.4 OTvar

While the *Egali* typeface was in development a significant typographic and technological advancement was released within OpenType font format specification version 1.8, OpenType Font Variations (OTvar). In the article "Introducing OpenType Variable Fonts," John Hudson (2016) points out the perceived importance of OTvar by the coordination of its developers: Adobe, Apple, Google, and Microsoft – these key players in technology aim to provide easier access to interpolation functionality. OTvar extends the control of interpolation axes (weight, width, e.g.) from the font designer to be intuitively controlled by the end user as well.

In her M.A. thesis, "From Responsive to Live – The Role of Typography in The Internet of Things," Marlene Arnold (2017) points out that the ability to experiment with OTvar fonts still requires a very high level of

technical ability and understanding of code. Arnold (2017) projects OTvar to work with a vast array of inputs provided by the evolving environment of web-connected devices, the Internet of Things (IoT); axes can be developed to adapt text to many different sources of information. “A ‘smart font’ would be a Variable Font containing new design-axes and together with sensors and technical aspects producing an automatically reacting font,” (Arnold, 2017). OTvar may directly address the complex issue of many specific font files when it comes to providing wider support for readers with different visual requirements by many versions with fewer and highly adaptive typefaces and the tools to control them.

4.5 Privacy

A major concern raised by this project is the issue of privacy in public display of text. Should digital signage be implemented in public settings that can display text modified to a particular user, it could reveal cultural or medical details about an individual that would otherwise be invisible. The well-meaning intent to treat everyone equally could provide information to predatory entities who seek to harm or exploit certain populations.

A system that coordinates individual reading preferences, as the *Egali* RDS demonstrates, would need to catalog and disseminate language preferences through an application to provide quick and effortless support for individual needs. The growth of surveillance through computer/web monitoring and video tracking both in and outside of institutions could provide very specific details about users based on their interaction with the digital signage. The ability to monitor and profile individuals that use specific languages and/or have specific needs could potentially dissolve aspects of their private life.

5. Conclusion

Through a new approach to designing typefaces and digital signage, support for a wider range of readers is possible. These speculative design tools demonstrate the flexibility necessary for language and letterform accommodation to be offered to suit individual needs. The robust typeface of *Egali* demonstrates its reach into an adaptive language environment through its extended Latin and Cyrillic characters, as well as modified versions of the font that serve readers with visual impairments or dyslexia. The coordinated experience provided by the *Egali* Reactive Digi-

tal Signage (RDS) exemplifies what an egalitarian design environment could be. The functioning *Egali* RDS prototype also allows for greater depth of content to be accessed simply by approaching a screen. This novel approach to a public design space serves many needs of the user simultaneously. The concept of these new tools of design can inform the development of new approaches to inclusive and reactive language support for a variety of needs.

An additional level of support this system provides is welcomeness. Language is our way of showing thoughts. Welcomeness is a constructed perception built from many signals drawn from the environment of an individual. As a key component of personal identity, language fluency determines one's level of inclusion in society and the communities one interacts with. An individual is surrounded by text, both on and off screen, that visually represents inclusion in various communities or groups. The *Egali* typeface and Reactive Digital Signage (RDS) provide one component of a welcoming atmosphere through the ability to fine-tune messages to individual preferences as well as provide greater depth of content.

There is a commonly held concept for the use of tools within the realm of design: "In use, we often want a tool to be transparent, at other times, ... we may want the tool to call attention to itself." (Wilcox, 2013). The goal of graphic design is to communicate; typography is its primary tool. Effective delivery of typography is not simply legible text, but also the context the message is presented in and the aesthetic or emotional cues it carries. When done right, these design choices influence the reader's perception of the message without the design itself being the object of focus. Using the *Egali* typeface and RDS as an example, it is not hard to imagine a design landscape where the process of receiving messages tuned to personal needs or preferences is "transparent" as well as providing content that adapts to the user and is naturally and effortlessly consumed. An egalitarian language environment can reinforce many aspects of an individual's identity in positive way. This project is a first step in utilizing typography and digital signage to not only communicate the message, but also impart equal value to every person who encounters it.

Karl Engebretson
Lecturer, University of Minnesota Twin Cities,
College of Design,
karlenge@umn.edu

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A Concept Simulation Framework for Improved Design Practice and Teaching

Kyle Graham Brand

Abstract

Contemporary Industrial Design practice has seen an increasing amount of hybridisation of digital and analogue techniques and tools. Industrial Design has also grown to encompass a far wider scope of activities, including service, experience and system design. This has led to much of the terminology and definitions being used in new and different contexts. At the Industrial Design program of the Tshwane University of Technology, it became evident that there was often ambiguity in terminology and definitions that were used. What was the difference between a model and a prototype? Is a 'hack-job' a type of prototype? The confusion that this was causing was between both students and lecturers, as well as amongst the lecturers themselves. These terms and definitions, often forming a kind of 'designer's jargon, needed to be better defined, organised and structured within a framework. The intention with this framework was to improve consistency amongst lecturers, avoid confusion for the students and provide these students, as future working professionals, with tools to clarify the process and the expectations of clients. The development of the framework was, and still is, a work in progress with lots of experimentation and redefining. As it was integrated into the teaching and projects we observed not only better clarity for all involved, but also an improvement in design practice. This paper describes the *Concept Simulation Framework* being used at the Industrial Design program of the Tshwane University of Technology as well some results from its integration into our teaching and projects.

Theme: Language
Keywords: concept-simulation, industrial-design, framework, practice, teaching

1. Introduction

Industrial Design as a profession is relatively young in the formal sense. The international body for Industrial Design has undergone many changes in its 60 years of existence (World Design Organisation, 2017). More recently the renewed definition of Industrial Design has a stronger emphasis on a broader trans-disciplinary design approach (World Design Organisation, 2017) as opposed to earlier definitions which were more product

(especially physical product) centered. This widening scope of what constitutes Industrial Design has been echoed in practice, and potential future practice, in the field (Buchanan, 1992, p. 11). The evolutionary nature of Industrial Design, as well as its reliance and integration with contemporary technology, has a profound influence on the manner in which it is, or more importantly should be, taught.

Although specific skills linked to contemporary systems (e.g. Computer Aided Design, rapid prototyping etc.) are important and useful to teach. Their value lies predominantly in the application of these skills in new and developing contexts with their associated problems. With the change in the definition of Industrial Design, there appears to be a shift in design teaching toward more core skills which are applied to a broadening range of design problems. This is closely linked to service and system design, as opposed to, what is often seen as traditional Industrial Design with the design of physical products. One could then easily argue that 'Design Thinking', is therefore the core skill to impart to students, because it can be applied in a vast array of contexts. However, teaching only core theoretical skills could result in what Johnathan Ive describes as tragic, "...that you can spend four years of your life studying the design of three dimensional objects and not make one" (Dezeen, 2014). Ive blames the economics of it "So many of the designers that we interview don't know how to make stuff, because workshops in design schools are expensive and computers are cheaper" (Dezeen, 2014). Although this is likely the case it can also be linked to the broader issue of the widening scope of what is now defined as Industrial Design.

The question asked was, how would you link the "making" of physical artifact solutions to broader concepts of *Rapid Prototyping* (IDEO. ORG, 2018), but still include abstract system orientated problems (linked to the broader definition of Industrial Design)? The intention with creating this link is to ensuring students can deal with both physical artifacts as well as system and service solutions. It soon became apparent that the answer is, less so in what was taught, but rather in the terminology used and the structure and focus that this terminology endows. This paper describes the current position held by the author in terms of the definitions of some specific terminology, commonly used in Industrial Design teaching (and therefore practice). However, this is given within the context of a framework, in order that the terms and their associated definitions are given contextual position. The intention is to describe and thereby propose the clarification of specific common terms, within a framework. This

is so that both teaching and the resulting practice of Industrial Design can be improved through clearer use of jargon linked to 'Design Thinking' methods.

2. Design Thinking a Core Skill

As described above, the core skill, that is not context and problem specific, is what is commonly termed 'Design Thinking'. A brief search will reveal many different versions and descriptions of roughly the same process. There have been several attempts to combine and assimilate the different models and descriptions, but ultimately it is the role of the individual implementing or teaching the process to describe it and adjust it in a manner which fits the situation at hand. Design thinking is best described as a cyclic process where you iterate various solutions testing them and learning from these tests (d School, 2018, p. 6) (Brown, Design thinking, 2008, p. 1). At the Tshwane University of Technology, Industrial Design program, we found that we needed to keep it very simple and adopt common, broadly used terms. The terms we use to describe the different phases of the cyclic iterative process are: DESIGN-MAKE-TEST-REFINE. Although the term 'design' should be replaced with 'conceptualise' as the whole process is 'design'. It is still used, albeit incorrectly, mostly for practical reasons. Most of our new students are very naive to design, and understand it to be 'coming up with ideas' which is what you want them to understand, as only the first step in the process. The terms are therefore used mostly to instil an iterative process of thinking and action in students and thereby to break away from the misconception that if I simply have a 'good idea' I have 'designed'.

3. A New Subject for a New Program

After the first five years of the Industrial Design program at the Tshwane University of Technology, the program was restructured and some subjects were changed. One of these subjects was *Freehand Drawing*, a subject where design sketching is taught. Previously, the subject's focus was teaching drawing techniques (perspective, shading, hand-rendering, etc.) in order that students develop skills where they could sketch representations of concepts for both communication and review. The aim was that students become competent in design-sketching as a tool that they could use within the iterative design process.

The rapid development and increased accessibility of various technologies, including computer modelling tools and digital-drawing systems, led to the lecturers asking the questions: "What will *Freehand Drawing* look like in the future? How do we teach so students can easily adapt to new systems and techniques?" Therefore, the starting point for the development of this new subject was to relook at the core purpose of design drawing. This core purpose is that of simulating a concept for both communication and review. It was clear that this idea of simply 'simulating a concept' could be achieved through a broader range of tools and techniques that would include, but not be limited to sketching. Therefore, *Freehand Drawing* morphed into what we call, '*Concept Simulation*'. It now encompassed any technique or system that would be used to simulate a concept to the necessary level of fidelity for the purpose of the simulation. A key element in this process of simulating concepts is purpose of the simulation as this will define the level of fidelity required. Fidelity here refers to the 'degree of exactness' to the real thing, which would be the final design.

This subject is, however, extremely broad especially in terms of the various techniques and systems that could now be encompassed by it. It was, therefore, decided to divide the subject into three main categories. These were *Freehand Drawing, Model Making* and *Demonstration and Communication*. *Freehand Drawing* formed a core part of the subject as a sketch in many ways is the foundational tool for simulating a concept, outside your own imagination. *Model making* which is more accurately described as physical simulations, encompasses the different physical mock-ups, models and prototypes. *Demonstration and Communication* aims to improve the communication of concepts using language, gestures and communication aides. It was the process of describing these, that birthed the *Concept Simulation Framework*.

The journey of Concept Simulation Framework's development thus far began with the initialisation of the *Concept Simulation* subject and then focused on investigating the various categories. The first of these categories that was explored was *Model Making* (physical simulations). During design projects, lecturers often became frustrated by students not building simple mock-ups or models to test aspects of their designs. The intention was to get students to adopted what IDEO describe as rapid prototyping (IDEO.ORG, 2018). However, it seemed that students were actually confused by what was expected. Therefore, the terminology needed to be clarified and organised.

The next section that was focused on was *Freehand Drawing*. During this process the linking across the framework was also identified and clarified. This framework as it currently stands is described in the next section.

4. Concept Simulation Framework and Definitions

One of the key directives of the framework is to provide clarity, as well as, help students and novice designers better navigate the different tools, techniques and methods. As design methods and tools have evolved they have become less siloed. The linier approach to activities conducted during the design process are a thing of the past (Buchanan, 1992, p. 15). You no longer 'do research' then 'draw concepts' then 'do Computer Aided Design (CAD) models' then 'Prototype'. The trajectory of a project is less likely to follow activities and rather follow what is described as the fidelity of the simulations. The framework aims to provide scaffolding for the various activities, but still allow lateral movement between these activities. But first the position held by the author in terms of some definitions needs to be clarified.

4.1 Physical Simulations

IDEO, and many others, have advocated for the value of building models termed as "Prototypes" (IDEO.ORG, 2018) (Jang & Epstien, 2005, p. 665). As much as this is extremely valuable, the terminology used was causing confusion among our students and we suspect others also. The famous example shown by many on the value of prototyping is IDEO's prototype of an otolaryngology tool seen in figure 1 (Morris, 2012), (Suzuki, 2010) (Brown, 2008, 17:08).

Tim Brown uses this (Figure 1) as an example of "low-res prototypes" (Brown, 2008, 16:37). Although this approach of making low-res prototypes is valuable, we avoid using the term prototype because it can cause confusion. Often the word prototype refers to the 'first of its kind', or the 'final design made in a different way' (e.g. 3D printed as opposed to injection moulded). Within the Concept Simulation Framework these low-res prototypes are called low-fidelity physical simulation or 'Mock-ups'. Within the framework physical simulations fall along a scale of fidelity as this helps define the nature of the simulation (Jang & Epstien, 2005, p. 652). We have adopted the term 'Mock-Up', also called 'Hack-Job' for

physical simulations which fall on the lowest end of fidelity scale. The term prototype is therefore used only to describe the highest-fidelity simulations. With mock-ups being the lowest fidelity simulations and prototypes being the highest, the middle is filled with what we term models. However, we require a description for the type of model. It cannot simple be a model, it should be [description]+model (e.g. scale model, visual model, digital model). The lines between these three types of physical simulations are often blurred and project dependant. However, a helpful distinction is as, long-time design lecturer, Phillip Oosthuizen defined it: "...you mock-up the size but you model the form" (Oosthuizen, 2015). Whereas the distinction between models and prototypes is that, models have a specific purpose, whereas a prototype is more general purposed, to demonstrate the complete design (or general part thereof with a prototype part). The fidelity scale in the framework for physical simulations is seen in figure 2.



Figure 1 A 'Prototype' by IDEO demonstrates a very useful technique, but should rather be called a mock-up to avoid confusion. Image (Morris, 2012)

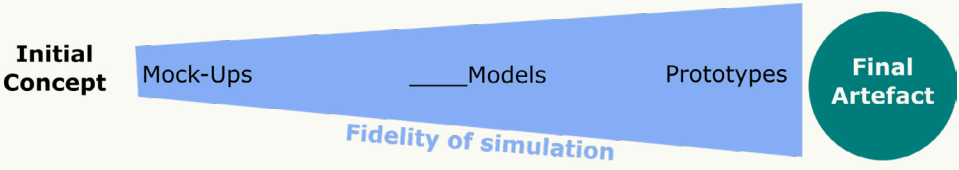


Figure 2 Physical Simulations definitions as they increase in fidelity – Illustration by author

4.2 Drawings

Sketching is, as noted before, still a very foundational tool to use when simulating a concept or idea and forms a kind of "design language" (Jang & Epstien, 2005, p. 651). This is both to communicate (within a team or to a client or lecturer) and/or to review (you as the designer can step back and look at your idea) the concept. As computer modelling systems (CAD) have advanced, it appears that they are being used earlier in the design process. As these systems improve further and computer interfacing devices change it is likely that they will be adopted even earlier in the design process (because they are quicker and easy to use). The question that had to be answered was: "Why draw it by hand (both analogy and/or digital) when it is quicker to model on a computer?" The first answer is to avoid some of the pitfalls that this creates, where designs appear 'finished' and critique is not as easily given (frog Design, 2013, 2:50). Therefore, we often forced student to hold off utilising computer modelling systems. This is a similar reason for using Mock-Ups as opposed to models or prototypes (Interaction Design Foundation, 2018). The second answer is more complex. Both of these activities (drawing and CAD) have specific advantages and disadvantages. We proposed that a hybrid and fluid movement between freehand sketching (analogy or digital) and computer modelling could prove to be a better approach. In other words, use the tool that is most efficient for the task, but move freely between the different tools and techniques.

This hybridisation can and should occur between sketching and CAD but should also include physical simulations. However, during the earlier phases of a design project very rough sketches and Mock-ups (as defined in 4.1) are generally the most efficient, and therefore best, choice for generating lots of ideas. In order, to once again, clarify we sought to define specific drawing/sketch types and link these to specific phases within a design project. *Design Sketching* by Olofsson and Sjölën define three types of drawings; Investigative and Exploratory, Explanatory and Persuasive Drawings (pp. 20, 46, 72). Thomas Valcke in *Basic Drawing for the Industrial Designer* breaks the first category into two; Ideation Drawings and then Exploratory (Valcke, 2018). These four categories; Ideation, Exploratory, Explanatory and Persuasive aligned best with the framework and were therefore adopted.

Ideation Drawings are defined as drawings used to frame the problem and ideate many and varied solutions (Valcke, 2018). They are characterised as loose, rough and quickly drawn (Sjölën & Olofsson, 2007, p. 20).

Mind-maps and lots of written notes can also characterise these drawings. These drawings are linked to Mock-ups more than any of the other physical simulations. Generally, Ideation drawings are far more efficient than any computer modelling system for generating many rough ideas, and as such would seldom see any hybridisation with computer modeling systems.

Next, Exploratory drawings explore some of the ideas created during the Ideation drawing phase. These drawings are used to explore form, function, proportions etc. The best way to characterise these drawings is with the word 'explore'. You are exploring, not necessarily sure which direction yet, a few different paths and seeing where they take you. Explorative drawings could still be used in idea generating, similar to Ideation drawings, but often these new ideas are inspired by other generated ideas, rather than only research or other inspiration. Explorative drawings have strong links to Mock-ups and various models. We encourage our students to use some of their explorative drawing pages to document the tests and experiments that are conducted with other simulations (especially physical simulations). On a page(s) students are encouraged to document the following (figure 3).

These four blocks; Problem/solution, Assumption, Test, Result link to not only sketches but also other types of simulations. We encourage students to record their tests/experiments using videos, photos and even

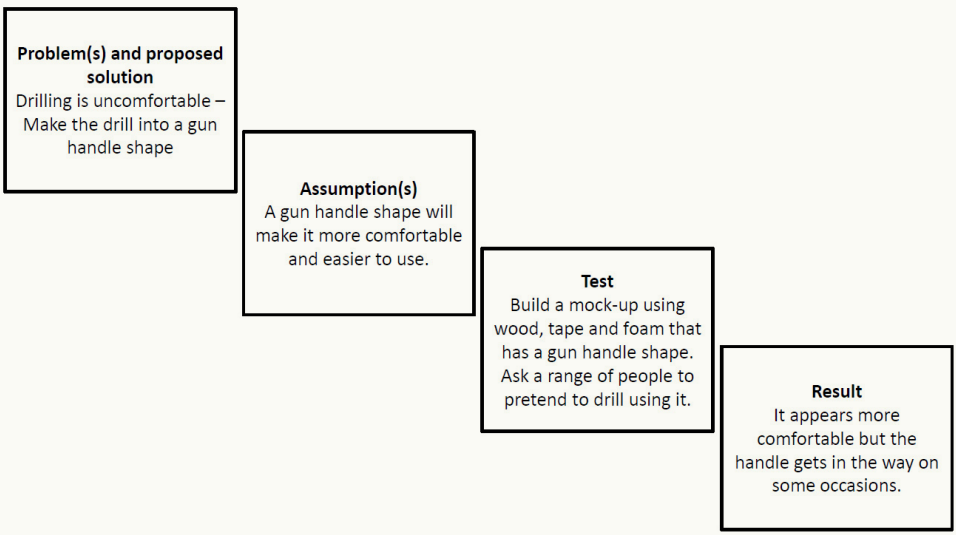


Figure 3 Explorative Drawing Page showing an example of how to document an experiment process – Illustration by author

screenshots/screen-recordings of digital simulations. Then these photos, screenshots etc. can be printed or used digitally to sketch on top of to create hybrid, multimedia concept-sketch pages.

These hybrid pages begin during the Explorative drawing stage and could continue through to the Explanatory and Persuasive stages as well. One of the techniques taught, is to use CAD models but print them out in a way that drawing on top of them is made easy. One of the ways this can be achieved is by using the open source software package *Blender 3D's Freestyle Render* (https://www.blender.org/), which allows you to generate only line-work (Blender.org, 2018). *Freestyle Render* offers many option for control over the line-weights etc. so it can be used to generate images that look like hand-drawn sketches, which in turn makes it easy to draw on top of (see figure 4 below). The intention with this technique is not to create "fake" sketches but speed up workflow and further blur the distinction between analogue and digital techniques.

Thirdly, Explanatory Drawings are where details like colour, materials, assembly etc. are more defined (Sjölén & Olofsson, 2007, p. 46). You are now no longer exploring but beginning to 'explain' the design.

Lastly, Persuasive drawings aim to utilise the 'artistic flair' and thereby the persuasive nature that hand-drawings offer (Sjölén & Olofsson, 2007, p. 72). It is with these drawings that the hybrid approach of using

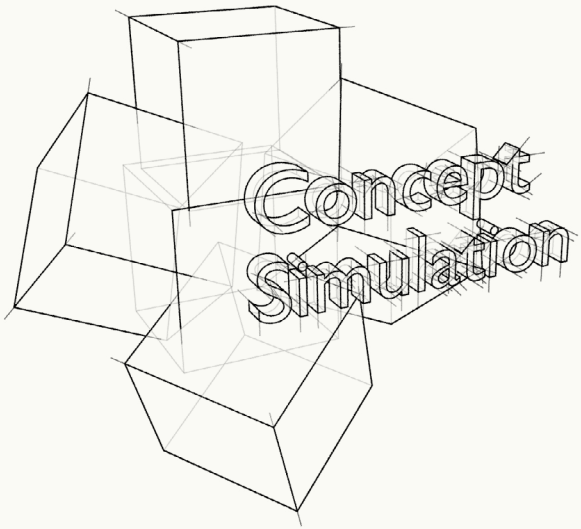


Figure 4 Freestyle Render using Blender 3D – Image by author

CAD and other systems to assist with the drawing is of great value. In many cases these drawings are done at the same time, or after, digital models or other CAD outputs are complete. Therefore, it is useful to use some of these CAD outputs to assist with these Persuasive drawings, to reduce the time it takes to create them, but still capitalise on the value attached to hand-drawing (artistic flair, etc.).

Most of these definitions are further explained and defined in literature like those that have been referenced. The main focus here is to agree on the four drawing types, and their general definitions, as they provide better clarity in terms of the type and nature of drawings and link well within the framework (see next section)

4.3 The Framework

The framework begins with the four major phases of a design project. They are defined as: Analysis & Ideation, Concept Development, Concept Refinement and Delivery & Presentation. In figure 5 below it should be noted that the edges between the bands defining the phases overlap. This is to illustrate that it is often unclear when one phase has ended and the next started, but there should still be movement forward to the Delivery & Presentation. Analysis & Ideation can be briefly understood as the phase where the problem and surrounding details (users, context etc.) are under-



Figure 5 The four phases within a design project with edges overlapping – Illustration by author

stood and initial ideas are generated. The second phase is Concept Development, which is when some specific concepts begin to emerge and are tested using various techniques to determine which are viable and which not. This stage is marked by both divergent and convergent thinking with new ideas and solutions being developed, with some being disregarded as a result of discoveries made during testing. The third phase is Concept Refinement, which is when specific concepts begin moving towards becoming viable ideas and details regarding their realisation are addressed. Then lastly Delivery & Presentation is where the final details of the solution are delivered in the format required by the project. These phases should not be seen as phases which get repeated but rather as the overarching phases that are moved through as the project progresses. The iterative process (described in section 2) falls within these phases in different ways and at the different points. It most extensively used during the Concept Development and Concept Refinement phases. There is also obviously an increasing level of fidelity of the simulations as they move towards the bottom of the illustration. There might be situations when one would cycle back through the phases (right to the first phase and move back down), but this would be after a major output has been achieved, and likely to be seen as new project (e.g. version 2.0 of a design).

The 'simulation activities' which cross these different phases are shown in figure 6. One of these activities which is not strictly a concept

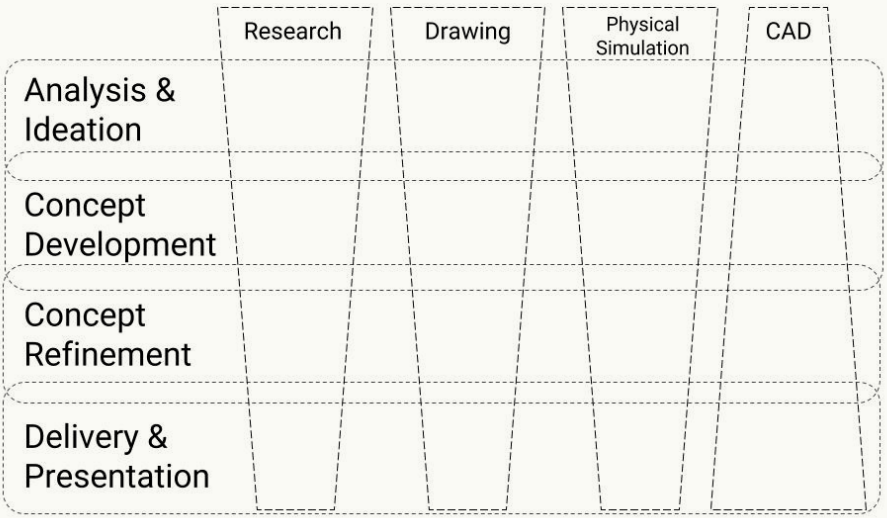


Figure 6 Activities across the phases – Illustration by author

simulation activity but it links directly to the many other concept simulations across the various activities, is research. It is broadly defined as any action which affords the designer information which assists the other activities and the final design. This could be user interviews, desktop research, material or manufacturing research and so forth. This has been extensively documented and is not covered in the scope of this paper, but is shown generally so that links to other concept simulations can be shown.

The activity shown as CAD (Computer Aided Design) has also not been extensively written about here, as most of the terms used are less ambiguous and often consistent even across different software packages. They are shown in the framework once again to show their place in the framework.

The tapering of the bands (figure 6), getting less moving down, for all except CAD, indicate the general quantity of activity (although hard to define and quantify). Interestingly CAD is likely to increase as you approach the final phase as it is often more extensively used to deliver the required outputs at the end of a project.

Within these bands of activities fall the various defined categories or types of simulations specific to that activity type. Figure 7 shows the general positioning of the various categories and outputs, within the phases

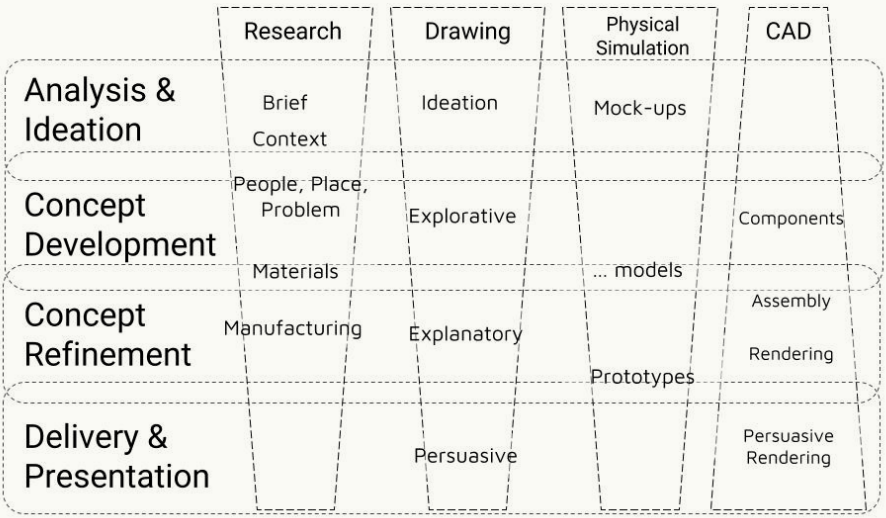


Figure 7 Categories and examples within the different activities and phases – Illustration by author

and activities. Firstly, 'Research' includes, but is not limited to; understanding the brief, user-research, contextual research, manufacturing and material research, cost research etc. Secondly, 'Drawing' includes the four types of drawings described in section 4.2. These fit quite neatly into the four phases (see figure 7) and therefore from a kind of backbone for the framework. They also help define what phase the project is in. An outside observer (or lecturer for example) could look in and see the type of drawings being generated and thereby determine with reasonable accuracy at what phase the designer (or student) is in. 'Physical Simulations' do not fit as neatly into the framework because they would vary depending on the project, but they generally follow the trajectory of mock-ups, models and then prototypes. Lastly, 'CAD' has digital models as the starting point which are then joined with other digital models to form digital assemblies. Then various outputs are generated using these models and assemblies.

The framework aims to help demonstrate how different activities and their specific outputs within different categories can occur in parallel during specific phases of a project. Depending on the required output, aligned with the phase of the project, different activities can be used to complement each other for maximum effect. This crossover (partially described in section 4.2) or linking of outputs across activities within phases is illustrated in figure 8.

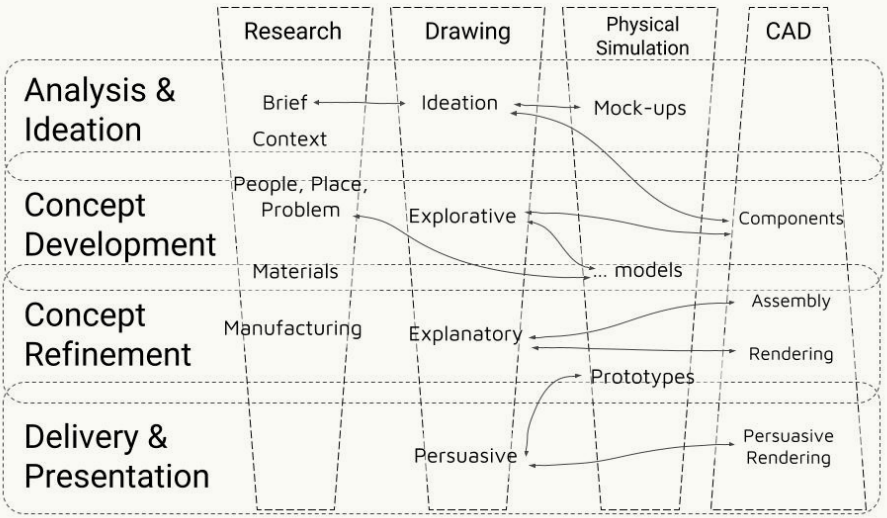


Figure 8 Various categories and outputs link and enhance each other across different activities – Illustration by author

The categories and outputs would vary depending on the project and type of final artefact or result. These act as a starting point, or example, of how one might organise current activities with their categories and outputs in the different phases, within the framework. Additional activities could be added and the phases might be described differently, but the overarching framework should act as a type of scaffolding which would allow for this.

5. Lessons and Plans

Initially this concept began as the development of a new subject, but the value of the framework is best observed when it is applied in design projects. The Concept Simulation subject, therefore, acts as an assistive subject to the other major design subjects.

The value of the definitions within framework can be observed in the way students use them when describing how they developed solutions to problems. For example, Jodean Steenkamp and Lebelo Kgwete remember the value of mock-ups and models when they designed a form, for a 3 litre water container, that could fit in a fridge door (Steenkamp & Kwete, 2017). Jodean described how he filled a large plastic bag with three litres of water and then proceeded to mould it using various mock-ups to determine the size and resulting form which would fit into a fridge door (Steenkamp & Kwete, 2017). This was a project done in their first year of study, they have now completed their third year. They were introduced to some of the early definitions of Concept Simulations and specifically physical simulation types in their first year of study, the framework and drawing types were only formally introduced to them in their third year of study. When asked what they thought about the framework, they both noted that it captured what they were already doing, but now it helped them organise it and, in many ways, forced them to do more work (Steenkamp & Kwete, 2017). Previously, they would do ideation like drawings on the same page as explorative and explanatory drawings. This would mean that they moved quickly from ideation to explanatory, whereas the framework forces them to ideate more, before concluding a direction for their designs (Steenkamp & Kwete, 2017).

An example of the different physical simulations as defined in the framework can be seen in figure 9. Figure 9 shows a ‘mock-up’ (left) of an initial concept for an improved electric screwdriver then the a ‘form and user test model’ (middle) followed by a 3D printed prototype (right)



Figure 9 Mock-up, from model and 3D printed prototype – Desing by Jodean Steenkamp, photos by author



Figure 10 Final Rendering with Branding – Design and Image by Jodean Steenkamp, used with permission

all created by Jodean Steenkamp. Figure 10 shows a digital rendering of the same design with branding applied.

Planned future projects which explore and utilise the framework in new ways using new technologies are projects which utilise new tools like 3D sketching using systems like the Grease Pencil tool in Blender 3D (Blender.org, 2018) or *Tilt Brush* using virtual reality sketching system (Google VR, 2018).

6. Conclusion

The Concept Simulation framework is still a work in progress, but by clarifying terminology and organising it into a structure provides, not only better clarity, but also better unity between designers. There is likely to be debate and many changes on some of the specific uses of terms

within the framework, but the intention with proposing the framework is to clarify jargon used within the design profession, especially that of Industrial Design. The unity that this consistency would allow, could assist with better teaching (students understand what is expected) but also with teams and between designers and non-trained designers. The framework was developed with a lot of flexibility to allow for changes between projects as well as when new techniques and tools are developed. The aim is that this begins a conversation which helps clarify and unify the terms used to categorise and describe the various simulations of concepts, which are foundational to the iterative design process.

Kyle Graham Brand
Lecturer, Tshwane University of Technology,
brandkg@tut.ac.za

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Cobotics

Developing a visual language for human-robotic collaborations

Ian Gwilt, Joe Rolph, Iveta Eimontaite, David Cameron, Jonathan M. Aitken, Saeid Mokaram, James Law

Abstract

The manufacturing sector is already undergoing a massive change, with technology led concepts such as Industry 4.0, the Internet of Things, and Ubiquitous Computing all leading toward greater digitalisation, automation and connectivity of processes, products and experiences. As automated tools and devices (robots) move beyond industrial cages and cross the boundaries of factory safety tape, the concept of collaborative robots, or 'cobotics', is emerging as a more nuanced way of thinking about future forms of human-robotic interaction. This shift in thinking wherein people and robots share tasks and activities in a co-located space moves beyond the simple binary construct of replacing jobs done by people with robots, towards a collaborative working paradigm that necessitates shared interactions. These shared interactions between people and robots reveal a need for new and improved interfaces and languages that can help individuals and communities engage with, understand, and trust ways of working with robotic collaborators.

This paper describes original, interdisciplinary research that investigates the development of graphical communication signage and visual interfaces for use in an industry setting. The signs were designed with the intention of building worker confidence in the introduction of co-working tasks with robots and the semi-automation of existing manufacturing processes. The research also involved the design of a set of co-design methods including surveys, interviews, workshops, generative tasks, experiments and design prototyping that were used to help develop a greater understanding of the attitudes towards working with robots amongst factory employees. We report on the findings from the research which challenge stereotypical thinking around robotics and their use and have engendered discourse with the research participants in respect to the potential of having shared tasks alongside robots in the workplace and the attendant implications for task efficiency and worker wellbeing.

The initial work was undertaken in 2016/7 by an interdisciplinary team of researchers including roboticists, designers, psychologists, and programmers from Sheffield Robotics. Initially funded by the EPSRC Centre in Innovative Manufacturing in Intelligent Automation, the research began as a feasibility study entitled 'Assessing Graphical Robot Aids for Interactive Co-working' (A-GRAfIC) (Eimontaite

et al. 2016). This study was developed through further funding from Sheffield University that facilitated the involvement of an industry partner and allowed for further research activities to take place in the context of a factory environment.

Looking forward, as robots continue to move beyond the current factory settings, to be used for more everyday tasks and services we will soon find ourselves working alongside and relying on automated devices, in healthcare, hospitality, entertainment, business, transport and other public service sectors. This means that individuals, families, and workers from a whole range of communities will need to feel confident and safe when engaging with these new automated technologies. The activities described in this paper presage ongoing research into the broader social- cultural impact of the collaborative robotic phenomenon, that point to an ever greater necessitates for the development of a shared/transferable language which communicates the nature of the partnerships, collaborative processes and expected behaviour protocols between people and robots.

Theme: Language
Keywords: cobotics, design research, interdisciplinary research, information design, signage, automated futures

1. Introduction

Co-working with robots (cobotics[1]) is a rapidly developing area of research and is identified as a key technology for Industry 4.0 and Factories of the Future thinking (UK-RAS, 2016). Researchers at Sheffield Robotics[2] devised a project to design and develop an original set of graphical symbols that could be evaluated within a real-world human-robot co-working

1 Cobotics is a term that is increasingly being used to describe where a robot is intended to physically interact with a human in a shared workspace. (http://jlaw.staff.shef.ac.uk/index.php/cobotics/)

2 Sheffield Robotics is an interdisciplinary research hub with researchers from the University of Sheffield and Sheffield Hallam University. It has one of the largest portfolios of ongoing publicly-funded robotics research in the UK. They play a leading role in the world robotics community, and promote the development of ethical, useful, safe, and sustainable robotic and autonomous systems that can enhance human prosperity across the globe. (http://www.sheffieldrobotics.ac.uk/)

environment. The aim of the project was to experimentally investigate the effect that the presence of graphical signage might have on an individual's task performance and sense of well-being while co-working with robots. To facilitate this a fictional co-working experiment was devised which allowed researchers to investigate how workers typically react and behave when confronted with a task that needed direct interaction with a robotic device to complete. Based on conversations with roboticist research and developers, proprietary design work for a set of bespoke graphical symbols was undertaken to facilitate the testing of what impact the introduction of print-based graphical signage into the cobotic environment would have on participants' ability, competence, and confidence in completing the task. Design work was also undertaken to develop screen-based iconography that provided the opportunity to present graphical symbols on screens and in time-based sequences, to explore the use of animated symbol-based information as a way to aid cognition. New symbols were designed for both a specific cobotic working scenario and as a way of introducing more general terms that the concept of a shared human-robotic environment was considered to require. Graphical signage was explored as a means of communication due to its capacity to convey information quickly and concisely, and potential to reduce cognitive load (Adams et al., 1998). Moreover, when well designed, signage should require people to have little or no prior knowledge in and situation or activity when decoding symbols, and be independent of written or spoken language (Traganou, 2016).

The project was undertaken by an interdisciplinary team of researchers, that utilised experience in engineering, computer science, psychology and design disciplines. A designer in residence program funded by The University of Sheffield allowed the engagement of a design researcher to undertake and evaluate participatory co-design workshops as a way of engaging with future user groups to facilitate understanding of the concept of interacting with collaborative robots, prior to their introduction in the workplace, or the actual experience of undertaking a cobotic task.

2. Partner Engagement

Working with an industry partner interested in the impact of introducing collaborative automated processes into its production line enabled the researchers to build on an EPRSC funded feasibility study 'A-GRAfIC: Assessing Graphical Robot Aids for Interactive Co-working'. The partner

engagement allowed for questions raised during the feasibility study in respect to individual differences in ability, confidence levels, and anxiety towards robots to be tested with factory workers. The industry partner was a UK-based mass manufacturer of clamping products for a diverse range of markets, interested in the development and introduction of robot co-working processes to improve safety in spot-weld operations. Consequently, spot-welder operators at the company were identified as potential users and beneficiaries of robot co-working. However, it was recognised that existing skill levels and limited experience of working with robots meant that some proprietary training would be required. The development of intuitive interfaces to assist in the operator/robot interaction was considered an important part of this process and the group was acknowledged as being ideally suited to take part in a co-design process. The company was keenly aware of the need to involve workers in the development process and interested in training workers to become robot-operators, as a means of improving wellbeing (current manual spot welding operations having an element of risk involved), and to help reduce anxiety around robots taking jobs. The research design afforded opportunities for this dialogue to take place and provided the current workforce with hands-on experience of a cobotic task. Spot-welder workers were invited through a general invitation to take part in the research process and the company allowed employees to include their participation as part of their workload commitment. The research engaged with a total of 39 participants.

3. Research Design

The project was carried out in four stages:

Stage 1: In this stage, discussions were undertaken with a group of 10 factory employee volunteers around what existing opinions relating to robots are commonly held and what might need to be considered when introducing cobotic tasks from an employee's point of view. This activity lasted approximately 1.5 hours and took place at the industry partners' facility. The discussion was confidential and feedback from the group was used anonymously to shape further stages of the project.

Stage 2: Two participatory design workshops were held to identify, develop and refine the types of graphical signage that might be required when co-working with robots. The workshops were held at Sheffield Robotics lab, with the same group of 8 participants attending both. These workshops also used a series of design tasks which acted as prompts for

wide-ranging discussion around the fears, concerns, and opportunities expressed by participants in relation to co-working with robots. Findings from these activities fed into the exploration of how signage might be used to address concerns raised and increase benefits and trust.

Stage 3: Participants were able to interact with a robot in the cobotic task devised for the research. The experiment investigated and quantified the effect graphical signage has on individual performance and how it can affect well-being (a sense of safety/security) while co-working with robots. It also looked into what variables have an impact on the perceived trustworthiness of robots by the individuals working with them. 39 participants were tested individually in a session that would typically last about 10 minutes. These sessions were divided into 2 categories, one control, one experimental. The control was presented with no signage, and the experimental with the dynamic signage co-designed during the design workshops. Neither were given any other form of communication in regards to the robot, task or environment, including verbal. Participants also completed a survey which combined the Negative Attitudes towards Robots Scale (NARS) (Nomura et al. 2006a) and Robot Anxiety Scale (RAS) (Nomura et al. 2006b) scales, prior to and following completion of the task.

Stage 4: The results of the research were communicated back to the participants through at 30-minute presentation at the industry partner's site.

Each stage of the research was confidential; the individual ideas/opinions/results were available only to the research team. A summary of the results was used in reports and future work but without revealing the identity of individual participants.

4. Developing the co-bot task for the research experiment

A KUKA Intelligent Industrial Work Assistant (iiwa) was used for the fictional human-robot co-working task in this research. The KUKA iiwa was designed as a collaborative robot specifically developed to allow direct human-robot interaction, with a set of configurable safety measures suited to co-working. The developed research task although fictional was designed to reflect a maintenance or disassembly task, whereby parts must be removed from a workpiece. In the task the workpiece consists of several long, thin tubes with components (bolts) that must be removed from the bottom of a number of the cylinders (Figure 1.). The small diameter of the tubes makes it impossible for a human to remove

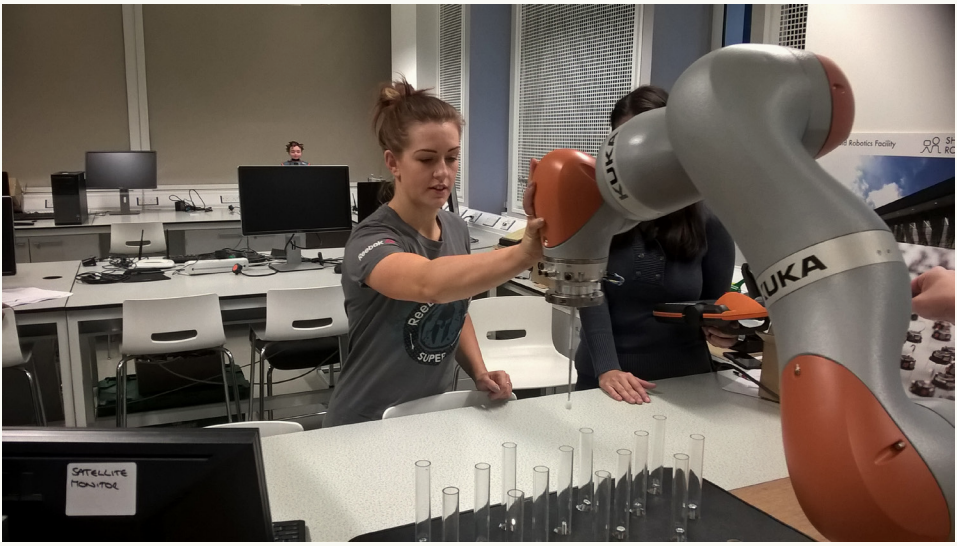


Figure 1. Setup for task/Experiment with a user interacting with the KUKA iiwa robotic arm.

the bolt without using some kind of tool, an added stipulation to the task is that the sides of the tube must not be contacted during removal. To achieve a successful result the task must be shared between a human and robot co-worker utilising the benefits of both parties: in the task, the human user provides perceptual and cognitive abilities, whilst the robot provides repetitive precision movement.

To complete the task, the human operator is required to identify which tubes contain components for removal and chose an order in which to remove them. They must then show the robot the location of the next component to be removed by physically moving the robot arm to a position above the selected tube. The robot arm then refines its position and performs motions to remove the component without contacting the sides of the tube. The component is then presented to the user for them to take it from the robot and put away before the cycle begins again.

5. Developing the graphical language

A main aim of signage is to provide information, and by providing information to allow people to respond to a given situation or instruction in an appropriate manner with confidence (Tufte 1993). Graphical signage as a means of communicating can be especially beneficial in industrial

settings (Adam et al., 1998). One of the most important aspects of signage design is to communicate information in a quick and concise manner. One of the reasons for the use of visual signage is to reduce the cognitive load required by the individual to process information before making a decision (Thorvald, & Lindblom, 2014). For example according to Laughery (2006), graphical signage can decrease the time necessary to navigate in unfamiliar locations, in manufacturing environments and road/highway settings. Graphical symbols are one of the most efficient methods of displaying instructions for individuals with little or no prior experience. Examples of this approach include the instructions for self-assembly furniture that enable non-skilled individuals to put together furniture by following visual instructions with no or little text-based explanation. Moreover, this kind of symbol-based instruction can be understood across cultures and is not dependent on written language (Traganou, 2016). In addition, succinct, clear symbolic displays in the work environment can benefit non-native language speakers and individuals with learning disabilities such as dyslexia (Lamont, et al. 2013). In summary, combining easy readability and a clear message through the use of graphical signs can be an effective way of delivering information; the graphical language aspects of this project were undertaken to establish and help understand how graphical signage can support human-robot co-working in a manufacturing setting.

To achieve this the following tasks were undertaken:

- Research into existing graphical languages and styles
- The identification of information to be visualised
- The design of a set of signs for experimental cases

As discussed, for the project a set of bespoke graphical symbols were developed to test the experimental hypothesis. In developing the look and feel of these new signs ISO graphical signage conventions have been considered (ISO 3864-1, 2011) Experimental/ iterative designs with a number of visualization options were undertaken (Figure 2.). The design ideas were discussed with the research team and preliminary user testing carried out. 8 participants were presented with the graphical signage and were asked to identify the meaning of each of the signs in their own words and to suggest what changes would help to make the signs clearer. Further refinements and changes to add clarity were undertaken in response to this testing. In particular, concepts that indicate ‘movement’, ‘different

action states', and 'amounts of energy' were explored. These initial signs also formed the basis of the co-design workshop activities.

Consideration as to where signage should be placed in the experiment, size, and form were also undertaken. A decision to combine the key interaction events into a composite sign was made as it was considered that too many individual signs placed in the environment would be visually confusing. (Figure 3.). The combining of the graphics into one sign enabled the designers to arrange operator-led and automated activities around a central 'cobot activity' symbol.

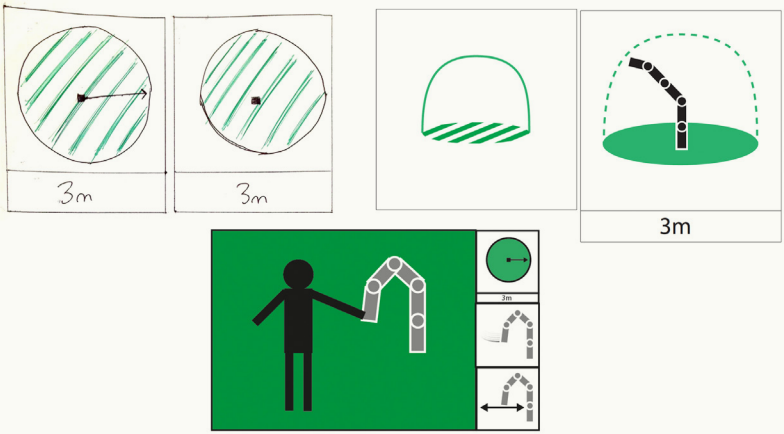


Figure 2. Developing the design of co-working with robots signage

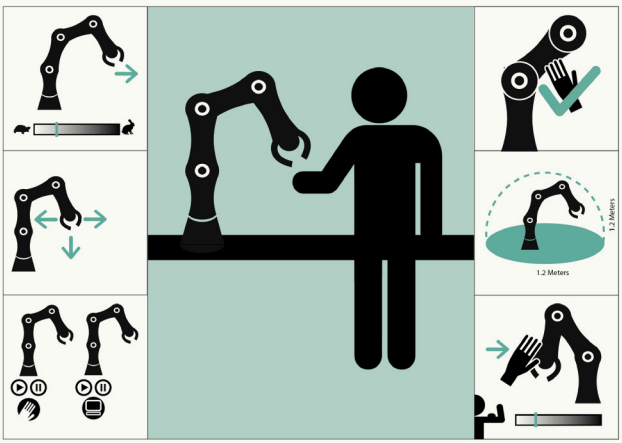


Figure 3. Composite cobot activity sign

6. Workshop design

The first of the two design workshops began with participants interacting with the cobotic task without any prior instruction. Within a group discussion, they were then asked what general information might foster confidence during operation of the cobot and what specific communication would assist in safe and efficient task completion. The first of the co-design tasks followed on from this group discussion with participants developing these required communications into a range of graphical signs using a toolkit of elements and other materials provided by the research team. They were then presented with prototype signage, designed by the research team during the feasibility study, critiquing these alongside their own signs collaboratively with the researchers (Figure 4.).

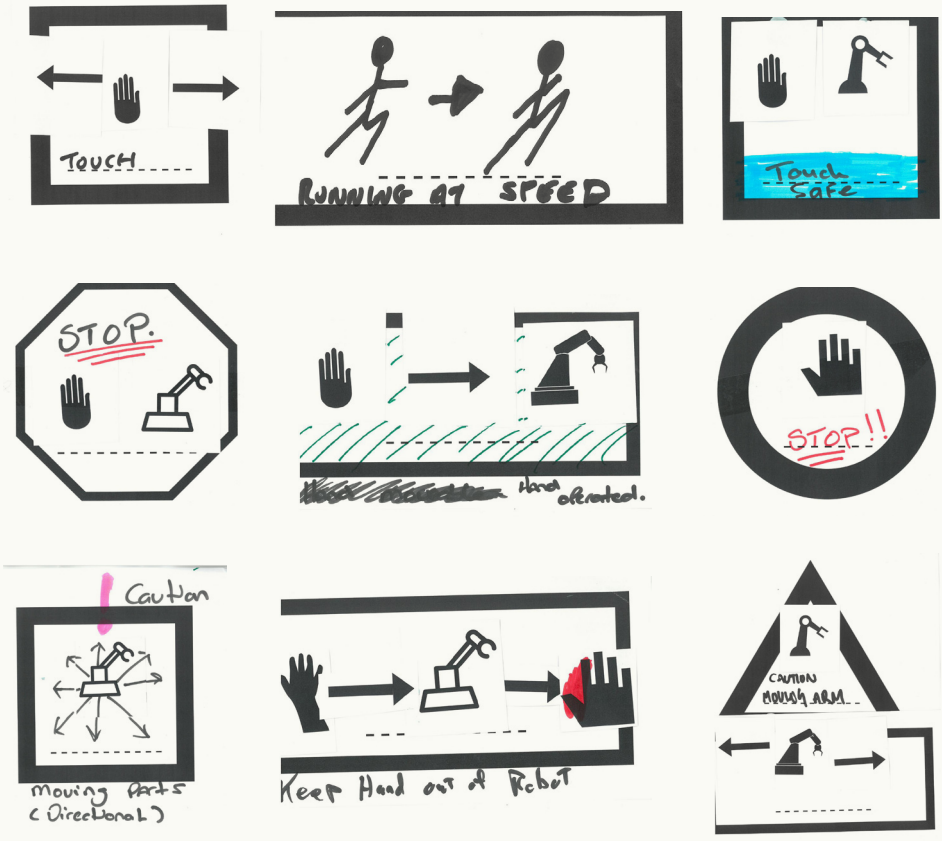


Figure 4. Participant designed cobotic working sign ideas developed in the workshop

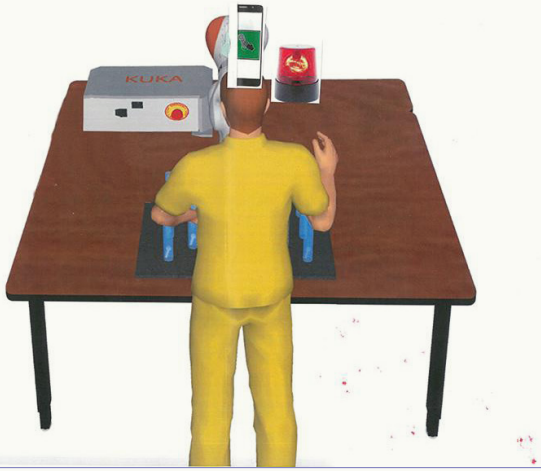


Figure 5. Example of a workshop participant's safe environment setup for cobotic working the second workshop.

This discussion lead to a re-design of the prototype signage develop by the researchers in the early part of the project and to the exploration of ways to transition from paper-based signs to a screen-based system of dynamic symbols, which would be presented in real time, at different points in the human-robot interaction sequence. The second of the two participatory design workshops centred around the collective critic and development of these animated symbols. Including discussion around the nuances of the visual language, and environment within the factory.

Within this second workshop participants designed their own interpretation of a safe environment in which workers could interact with a co-bot. A supplied toolkit which included images of a range of different safety technologies, robots and environmental items was used. These elements were informed by discussions with the participants in the first workshop. The task provided an accessible way for participants to visualise and prototype their earlier thoughts and ideas, considering the interaction of the signs with the factory environment. The task also prompted further discussion, critique, and development of ideas, detailed in the results section of this paper.

Throughout both workshops generative design tasks and surveys were also utilised to quantify changes in attitudes at both a tacit and explicit knowledge level. These included marking how they perceived a future shared with robots on a visual scale ranging from the dystopian view of the future (as illustrated in the movie Terminator), to an image of

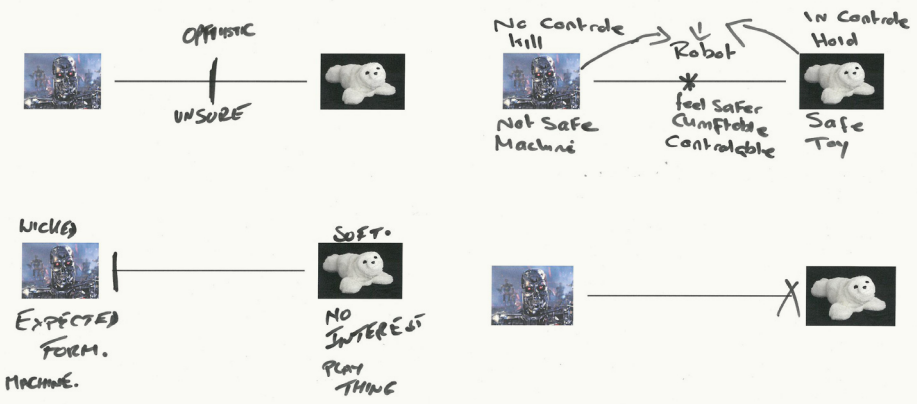


Figure 6. Example of workshop participant's marking where the perceived collaborative robots in industry on a scale

Paro a robotic pet companion in the form of a baby seal (designed for use by older people unable to keep pets) (Figure 6.). Participants used this scale at the beginning of the engagement, to provide a base-level reference point for possible changes in attitude. Later on in workshop two, participants also created t-shirt designs with the brief of communicating to colleagues how the introduction of collaborative robots might impact on them. These activities were used to further provide opportunities to document and identify shifts in opinion.

7. Workshop observations and findings

As discussed prior to the design workshops a focus group with 10 participants was held at the industry partners site, this lead to a number of interesting insights, which shaped the subsequent workshops and engagement. This included a conversation around participants preconceptions of traditional robots in manufacturing, which were largely shaped by the media. For example news footage of large fully automated robotic arms which operate in automotive factories. Those who had previously worked with traditional robots within the manufacturing environment saw them as dangerous machines, which are situated behind safety cages, a space you did not enter unless you were a specially trained engineer. These pre-conceptions of traditional robots entirely shaped conceptions of, and attitudes towards collaborative robotics, a technology and con-

cept to which they had not previously been exposed. Fears included job loss, safety, maintenance and collaborative robotics presenting a stepping stone towards fully automated factories with little or no human input. However, the perceived benefits of the cobotics model included safety, with the cobots acting as an interface between the worker and dangerous machinery. Also, a potential increase in job satisfaction was discussed, due to upskilling and the prestige of being a 'robot operator'.

The two design workshops aimed to develop an understanding of the nuances of future users' interaction with collaborative robots in the manufacturing context. With participants and researchers co-designing graphical signage that aimed to address identified issues and maximise opportunities. We discovered that participants found the cobot in the experienemt task easy to use when interacting with it without any prior instruction. "It feels natural", "Once you start it's easy to use" were indicative comments. However, crossing the initial threshold to directly interact with a robot was seen to be stressful, and alien. One of the primary functions of the signage was identified as needing to encouraging and facilitation this initial interaction. In task one, one of the major points of friction/tension between person and robot was identified as being when an error occurred. This was due to the cause of the error not being obvious or communicated, the operator was unable to learn from their mistake and anxiety around being responsible for breaking an expensive piece of technology was also seen. This made further interaction uncomfortable, and slowed efficiency, until trust had been re-established. Participants discussed the need for the following information to be communicated during or prior to the task:

- How much force needed to be applied
- The direction of robot's movement
- Speed of the robot's movement
- Crush risk at certain points during a process
- When you can touch robot
- When you can't touch the robot

In the other part of the workshop participants' moved onto designing signs based on these concepts from a provided toolkit of materials. Several of the signs closely matched the prototype signs developed by the research team for the preliminary study. There were also suggestions for more nuanced developments needed, specific to the particular manufac-

turing context. These were identified through discussion with participants about their own signs, and their design decisions. Examples include more clearly visualising the exact relationship between the positioning of the hand in relation to the robot, and better communication for the force users perceived they might need to apply to move/guide the robot arm, and the force that they actually needed to apply. Also identified was the need to carefully consider the positioning of the display of signs within the workspace which needed to visible by the operator but not in the way of the task. Due to the dynamic and collaborative nature of the task the participants explained the field of view of the operator can become very narrow, almost tunnel vision like, during high speed working. Without either the signs themselves or some means of an alert system being in the field of vision vital safety information might be missed. Additional ideas were proposed on how to address this, including projection, lights and haptic feedback.

As noted above, in the second design workshop participants first interacted with the Kuka robotic arm again, this time with a new series of dynamic signs, based on the previous workshop. They then re-designed the human-robot co-working environment, using a toolkit of signs and other elements informed by the previous workshop, this time based on the concept of having a screen-based signage system (Figure 7.). Much of the focus was on a system to alert the worker when they needed to look at the screen, or on methods of placing signs within the workspace and field of view. Several participants introduced the idea of audio warnings, but in the following discussion decided these might be lost in the noisy and cluttered soundscape of the factory.



Figure 7. Examples of workshop participant's screen-based signage and safe environment setup for cobotic working

8. Further thoughts on the development of the graphical language

Early in the development of the signs, it was decided that a new visual language was required with the focus of the work on improving employees trust and confidence in co-working with robots. Whilst safety is an important element of this, it was decided that too close of an alignment in terms of design and style with the ISO 3864-1 guidelines, and their association with danger, may negatively impact on other acceptance and confidence factors of cobotics, such as perceived level of risk and perceived ease of use. There was concerns from the industry partner, re-enforced during the design workshops that with both traditional automation and collaborative robots being used within the same factory, that signage which was aesthetically similar might lead to confusion and put workers at risk.

Elements within the pilot signs developed prior to the workshops; robots, people and other contextual elements, used a consistent dark grey. This allowed for the placing of emphasis on the primary communication or action within the sign, e.g. the direction of movement, force indicator, or perimetre of the robots reach. These actions where shown in colour (green or red). As well as creating a visual hierarchy within each sign, it allowed for a level of complexity without the sign becoming confusing. The type of direct interaction users have with collaborative robots within a shared workspace, is one which is novel in manufacturing. How operators should act within this unfamiliar and 'alien', context was required to be clearly communicate within each sign. Example designs included clearly showing the full robot in the sign; communicating the level of force users should apply; and the robots possible directions of movement. (see figure 3.).

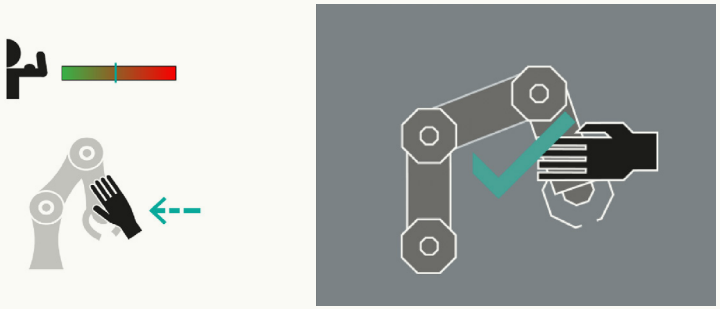


Figure 8. Screen-based experiments in cobotic task communication

Translating the signs from print, to screen-based allowed for the addition of animation and for the signs to be seen at the specific part of a task sequence when they were required. They would then be replaced by the next sign in the sequence. Animation was also useful as it allowed for the communication of the nuances of the interaction, such as the way in which the users should position their hand to move the cobot.

Whilst the formal design elements of the visual language came from decisions made by the research team, most of the significant contextual/ changes in clarity came as a result of the design workshops, and insights from participants. Early iterations signified "touch the robot" through a green tick, as seen in (Figure 3.). In the first design workshop participants explained that changes between "do touch" and "don't touch" signs could be difficult to notice within the context of a busy factory – with their focus primarily on the task – and the visual noise of that environment. Subsequently a bolder use of colour was introduced. This version of the sign, along with others which had a selection of designs were presented in the second design workshop (Figure 9.). Participants selected the version at the bottom of the sequence to be the most effective. This use of bold colour also looked to address the concern that signs on a dynamic screen might be missed due to a workers 'tunnel vision' whilst assembling parts. With correct screen positioning, it was expected that the change between "do touch and "don't touch" would be most visible in the workers peripheral vision.

In the digital display form varying formats for displaying signs were explored. The research explored whether or not all signs need to be constantly displayed in order for users to refer back to them; did they only

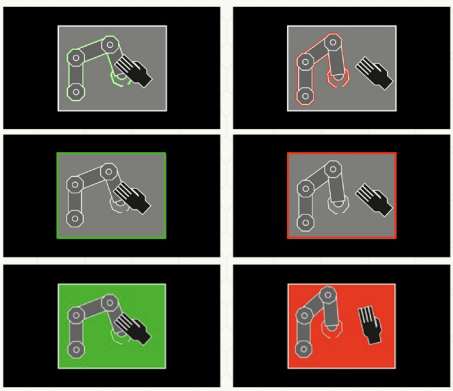


Figure 9. Design variations depicting touch and do not touch the robot modes

need to be shown at the start of the interaction; or should relevant signs be displayed at specific times during the interaction. Participants thought that displaying information on the robots characteristics, e.g. it's reach, were only required at the beginning of the interaction. The most important information during the interaction was seen to be information on when they should touch the robot, or not. The other sign that was requested in addition to "touch" and "don't touch" was the indicator of the level of force the user could apply. Almost all of the user errors during the experiment had resulted from excess force being applied. It was proposed by participants that a visual line indicating force (designed into earlier static sign examples) should be responsive to the user input in real time, allowing users to see how close they were to the robots force limits (Figure 10.). Thus enabling an operator to learn the limits of the robot, without time-consuming lock-outs that resulted from the use of excess force.

Along with the force level indicator changing in real time, participants wanted instant feedback when an error occurred. Allowing them to learn from that mistake, rather than be uncertain as to what caused it. It was felt that this uncertainty could lead to a break down in users trust in the robot, with them unsure if they, or the robot was responsible for errors or faults. The main example of this is the excess force sign, immediately displayed when the robot locked due to that excess force (Figure 11.).

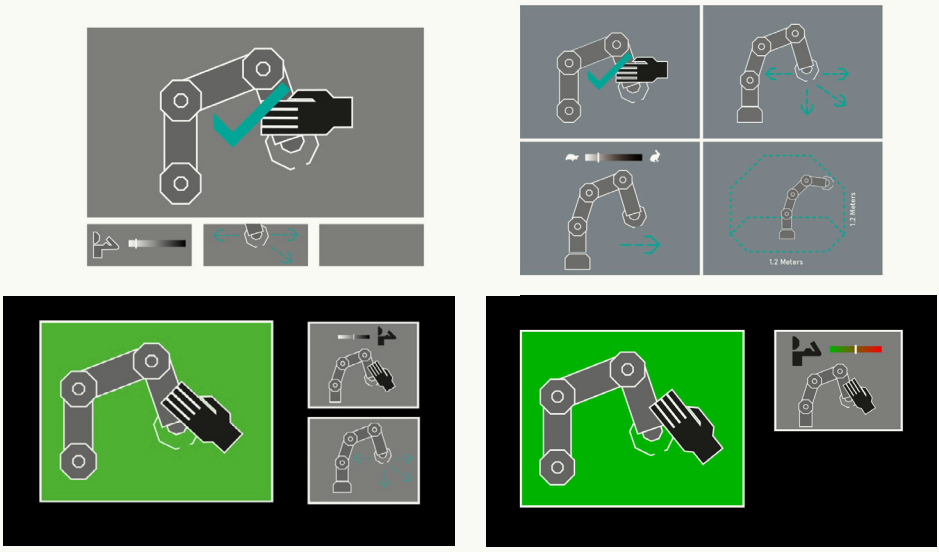


Figure 10. Design experiments looking at screen-based signage sequence, hierarchies and real time indicators for force applied

Following the second co-design workshop, a visual countdown timer was introduced into the screen-based system to indicate that another sign was due to be displayed. This was used primarily during a start-up up sequence when all the signs about the robots characteristics were displayed. This addition came from comments from the participants about not being sure when they were expected to do something or when the robot was still doing something This idea was used during the task experiment in the second workshop, and an improvement in participants waiting until the correct time to begin interacting with the robot was observed.

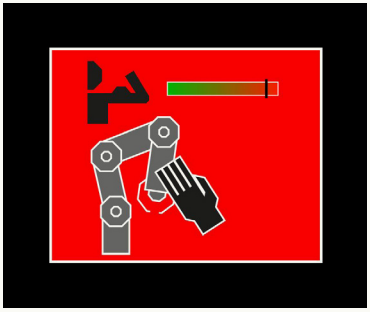


Figure 11. Screen-based symbol design for indicating excessive force applied by operator

9. Conclusions

Through the project activities we developed task-specific symbols that could be used on both time-based digital forms as well as in a printed form. We evaluated the use of the graphical symbols in the context of a co-working task and were able to report on their impact on co-workers comprehension, confidence, and productivity within a proposed new co-working experience. In addition we investigated issues and attitudes around robots and confidence in working with them, helping to answer questions concerning the perception of robot trustworthiness and its influence on individuals co-working with robots.

The co-design processes acted as a tool for participants to explore and visualise possible future working contexts and interactions, prompting in-depth conversations about a wide range of themes. As participants better understood both the robot and interaction, they begin to see the safety benefits outweigh the risks. However, as earlier safety concerns receded, participants also began to identify new risks, including the safety/integrity of the engineered part the robot might be holding. Designing ideas for their own safety environments meant they could visually explore solutions to identified concerns, including the possible introduction of a flexible light curtain which would automatically switch off the process if crossed, with this only being active at specific high-risk points in the task. Participants also felt that the cobots and the systems and environments

that come with this technology would provide opportunities to upskill and have greater role flexibility. Particularly if a system of signage provided them with a standardised language of interaction with cobots across multiple workstations, processes or sectors of the business. There was also a desire for more in-depth knowledge prior to the introduction of cobot activities. This was in terms of both technical insights and also an interest in sharing of responsibility/ ownership of the process with co-workers and other shift workers. When considering this desire for technical knowledge, standardisation of language and the earlier thoughts on error feedback, participants saw the system of signs as an opportunity for on the job training. Who for example is responsible when an error occurs with a part, the cobot, or the worker? A feedback loop which reacted to situations in real time, and which varied in its invasiveness based on workers experience was discussed. The conversations which were promoted and facilitated by the design tasks were invaluable to the development of the concept for a system of dynamic signage and for understanding the need for a more holistic approach to the introduction of a cobotic task.

The positive shift in participants attitudes towards collaborative robots from the beginning of their engagement, to the end of the final workshop, was considerable. With those in the first phase, the focus group, highly fearful of the risk posed by collaborative robots and their introduction into the manufacturing domain. During the first of the design workshops, design tasks allowed them to visually work through and address numerous concerns, with the general attitude towards robots situated mid-ground in terms of negative vs. positive impacts. At the conclusion of the second design workshop participants were asked to design a t-shirt which would communicate something about collaborative robotics (Figure 12.). These designs were indicative of a general shift towards a positive mindset amongst the participants. Two of the participants from focus group were engaged with all of the subsequent activities. With both talking about the change in attitudes they had experienced and witnessed.

Following the design workshops and cobotic experiment, testing the impact of the co-designed signage, results provided evidence that the dynamic signage aided in improving response time for the experimental group, compared to the control group (with no signage). The experimental group (with signs) also saw decreased negative attitudes towards robots, along with a significantly increased accuracy in comparison to the control group. Further detailed analysis of results can be found in Eimontaite et.al. (2017).

10. Further work

In support of the main experiment undertaken in this research the developed symbols were tested using a head-mounted eye-tracking system and software. This was considered of interest to the researchers as it provided information on what the participants were typically looking at, for how long and in what order. A more extensive use of this method is planned tol be incorporated into future work (Figure 13.)



Figure 12. Examples of workshop participant's designs for t-shirts communicating the impact of robotics on manufacturing.

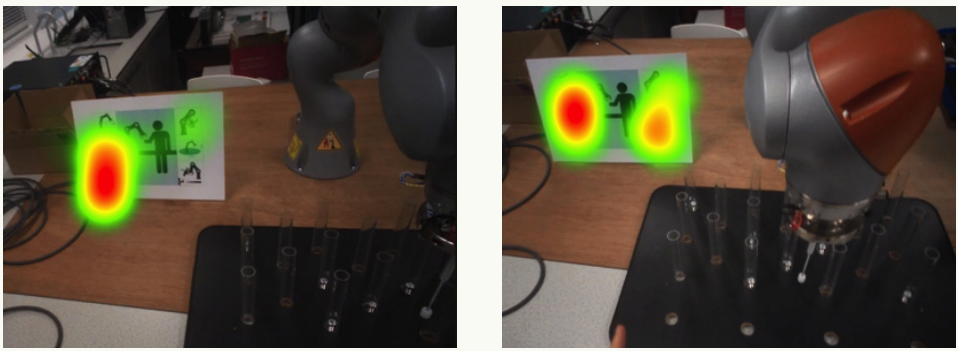


Figure 13. Heat-map visualisation tests of participant gaze from the experiment with an eye-tracking device in use.

The project symbols in both paper-based and digital form the foundation for the future collaborative development of a more extensive system of symbols that can be used to indicate a broad range of human-robot interaction scenarios. It is envisaged that different cobot activities will be able to draw from a toolkit of visual symbols and graphical elements to create bespoke context specific signage. Future work will involve the development of a human-robot co-working symbol toolkit will be prepared to a level where we will be able to present it to the British Standards Institute, the UK National Standards Body that links into the international standards community for potential application and uptake.

During the project it was identified that there are no generic 'cobot activity' awareness signs that exist. Preliminary work on developing new signs to fulfil this need has also begun.More broadly the project will develop a set of guidelines for the instigation of cobotic working scenarios and application of a human/ robot graphical symbol system that can be applied in a wider range of co-working scenarios and environments. Other manufacturing sectors with interests in this area, and to whom this approach would be relevant, include food production, aerospace, construction, electronics fabrication, and remanufacturing. This system will also be applicable outside the manufacturing sector, for example to the healthcare community, where human-robot co-working is already beginning to occur.

Ian Gwilt
University of South Australia The School of Art,
Architecture and Design, University of South Australia,
City West Campus, Adelaide, South Australia
Ian.Gwilt@unisa.edu.au

Joe Rolph
Art & Design Research Centre,
Sheffield Hallam University, Cantor Building,
153 Arundel Street, Sheffield S1 2NU, UK
j.rolph@shu.ac.uk

**Iveta Eimontaite, David Cameron, Jonathan M. Aitken,
Saeid Mokaram, James Law**
Sheffield Robotics, The University of Sheffield,
Pam Liversidge Building, Sir FrederickMappin Building,
Mappin Street, Sheffield S1 3JD, UK
i.eimontaite / d.s.cameron / jonathan.aitken / s.mokaram / j.law@sheffield.ac.uk

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Fashion Education in the Asia-Pacific

Learning together in a flat world

Icaro Ibanez, Lydia Pearson, Alice Payne

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Fashion Education in the Asia-Pacific

Introduction

This paper examines togetherness and difference in fashion education in the Asia-Pacific region through three perspectives: fashion designer, textile designer, and design educator. The backdrop of fashion education globally is that of industry turbulence: radical digital innovation, hyper-competition enabled by fast global supply chains, and a world simultaneously more fragmented and more connected. Aside from living in a 'flat' globalized world, increasingly students' experience of fashion and textiles is flattened to images on a screen. However, the future for fashion and textile design may lie in local, entrepreneurial, and artisanal approaches to making.

In this paper, we examine the idea of the local within the global, and explore how our experience of local, within the wider Asia-Pacific, shapes the fashion culture and approach to materiality of our undergraduate design students and of ourselves as designers and educators. Our teaching approach is to foster curiosity and material exploration within the students as they tackle the quixotic task of making garments in Australia, a country in which manufacturing skills are in scarce supply, and where there is no shortage of clothing, but a dearth of high quality materials. We discuss the desire for local fashion cultures in a globalized world through the notion of "fashion togetherness" in which cross-cultural partnerships may be forged to celebrate difference and find common ground. Through a series of undergraduate student projects and cross-cultural connections, we illustrate how geographical location can at once limit and expand students' capabilities in fashion and textile design. We close by proposing collaborative strategies in making, thinking and doing fashion that may be specific to one's own place but are shared collaboratively within regional networks of fashion educators.

Situating "Local" within "Global"

Some twenty years ago, Featherstone (1993) noted how the more globalized the world becomes, the more sensitive we become to local difference. Designer fashion industries are flourishing away from the traditional fashion centers (Skov, 2011). It now appears very old fashioned to speak of the "center" and the "periphery," as the promise of globalization is that of flattening, connecting, and equalizing opportunities. Yet in fashion, globalization has created more fashion centers, the so-called "second tier fashion cities" (Rantisi, 2011) and arguably yet more peripheries.

Examples of second-tier fashion cities include Auckland, New Zealand, Melbourne, Australia, and Copenhagen, Denmark, and scholarly studies of these proliferate (see, for example, Larner, Molloy, & Goodrum, 2007; Weller, 2013; Melchior, 2011), demonstrating an intense desire for local flavor in the face of fast fashion's global domination. Rantisi (2011, p. 264) identifies the factors needed for second tier fashion cities include a sense of local culture and character, creating "place-based relations and aesthetics," fashion marketing and production networks, and consumption networks such as local boutiques and retail precincts.

Australian fashion's aesthetic of place has been widely debated. Australia is simultaneously a young nation, and a land in which the traditional custodians are of the world's oldest living culture. This paradox is held uneasily within the country's culture and politics. In fashion aesthetics, Craik (2009) identifies elements of bush wear, surf and swimwear, and Indigenous design unique to Australia (see Figure 1). Designers have drawn inspiration from the colors of the landscape itself, and Australia's casual lifestyle has contributed other aspects such as the color, ironical humor – a "larrikinism" – and Australiana motifs (Gray, 2009; Healy, 2010) (see Figure 2).

Aesthetics and fashion cultures aside, as crucial to a local fashion is a local production system. In terms of production networks, the mixed blessings of globalization have brought cheap clothing to Australia, but at the expense of local industry (Webber & Weller, 2001). Over the past twenty-five years, Australia's manufacturing capacity has been drastically reduced. With the vast manufacturing hubs of Asia close by, former Australian manufacturers have transformed into brand managers (Weller, 2010). Even in the high end, designer market levels, local production is increasingly a challenge, with reduced capacity to manufacture locally. The majority of the remaining local manufacturing is based in the south east of the continent, in Melbourne and Sydney.

For graduate employment, liaising with offshore factories, typically based in South East Asia, appears to be the main way forward for designers. Technical skills and knowledge that once existed in Australia are disappearing. Accessing local makers and local materials is a challenge. Fabrics that may be more environmentally sustainable are chiefly manufactured offshore, and even if knitted locally, will be knitted from imported yarns.

If Auckland, New Zealand, is a "not-so-global" city, to use Larner et al.'s (2007) phrasing, then Brisbane, as Australia's third largest city, is



Figure 1. QUT graduate Arkie Barton, 2015, draws inspiration from her Indigenous heritage using her original artwork as digital print on fabric and referencing Dreamtime for her modern take on traditional culture in her final collection. Photograph: Charles Subritzky. © The State of Queensland 2017 (top right).



Figure 2. QUT graduate Stephanie Hollis, 2016, explores Australiana kitsch in stumpwork embroidery and mixed media applique. Photograph: Michael Greves.

even less so. In Brisbane, our fashion students live on the edge of the edge, dreaming of Europe, perhaps, or thinking of a fashion future outside of Queensland – in Sydney or Melbourne. Queensland is where you come from, it is not where you go, some would say. Yet there are opportunities when you are on the periphery. You can do anything on the edge, where people are not looking. You can fail safely, and so be brave and bold. One of the co-authors of this chapter, Lydia Pearson, demonstrated success on the edge, working in Brisbane for twenty-seven years as one half of internationally successful designer label Easton Pearson. In recent years, Brisbane has reinvented itself as a cultural destination, with the impressive and nationally recognized Queensland Art Gallery/ Gallery of Modern Art (QAGOMA), the largest modern art gallery in the country.

In Brisbane, immaterial fashion is ever present, in images projected straight to our students' phones. Yet materially, fashion is more remote than ever, as textiles must be ordered from overseas, or with no textile markets, and only haberdashery stores – either expensive or inadequate selection. Yet at the same time, masses of post-consumer textile waste clog recycling bins, charity stores, and landfills.

Fashion forecaster Li Edelkoort (2017) highlights textile experimentation of critical importance to ground and understand the reality of the garments and textiles to speak the same language of the industry which is based in the materiality of fabric.

Designing fashion in twenty-first century Brisbane is therefore an activity characterized by paradox. Just as there are more clothes than ever before in the shopping malls, consumers are less engaged with the materiality of the garments they wear, and activities such as mending or making have lost relevance. But at the same time, Queensland designers can project a life of sun and leisure to the world more easily than ever. This is one of the assets that Queensland has to offer, the sunny weather, natural spaces and the relaxed lifestyle. It is no accident surf and active wear lifestyle brands Billabong and Lorna Jane began in Queensland. In our experience as educators working in Brisbane, where local marketing and production networks are limited, our students will have to be independent, entrepreneurial, creative and resourceful–and forge their own networks.Although Brisbane can feel remote, as a city it has long capitalized on its place in the region, for example through QAGOMA's (Queensland Art Gallery & Gallery of Modern Art) 25-year history in hosting the Asia Pacific Triennial, an internationally attended festival focusing on contemporary work from across the Asia Pacific. Asia is one of the world's fastest

growing regions, as well as a key global manufacturing hub. Journalist Thomas Friedman (2007) made the observation that the world of the 21st century is "flat", meaning globalization, coupled with innovations in information and communication technologies (ICTs), allow greater interconnection between countries than ever before. For us, writing within the fashion context, a 'flat' world can mean greater opportunity to connect with our Asia-Pacific neighbours. Making these connections meaningful is the challenge. Alongside the many affordances of ICTs in allowing connection, there is a new need to combat the inevitable flattening of the material experience of fashion to a screen. In the next section, we discuss the approach we take in education to introduce themes of community engagement, savoring the materiality of fashion, and looking outward to our place in the region.

Teaching Approach: Cultural connections and new materiality

Our approach to learning and teaching takes into account the multiplicity of experiences of fashion, and notions of sustainability are at the core. Units of study on sustainability and materiality expose students to the complexity of fashion systems of production and consumption, and provoke them to respond to systemic challenges through awareness raising initiatives and creative interventions. These activities occur in partnership with charities and sustainable fashion advocacy groups, raising the stakes of the tasks to prompt outward looking engagement.

Early in the course, students examine the opportunities of artisanal production, in which they are exposed to luxury, artisanal, and handcrafted approaches to making, from screen-printing to the Japanese dyeing technique Shibori, embroidery, and hand weaving. Alongside this textile development, students explore traditional and new methods of tailoring and patternmaking. Lecturer Carla Van Lunn's personal philosophy of sensitively revalorizing waste has inspired this approach to "making do" and generating materials and opportunities from what is at hand, as bricoleurs (Levi-Strauss 1966 [1962]; Binotto & Van Lunn, 2014). This philosophy of frugal design comes through in students' inventive textiles in final year.

In their final year, the students develop their graduate collections to present to industry members and the general public. By now, students are outwardly focused, thinking about their professional future. With limited

opportunities for true design positions in our local industry, many students consider the potential of being an individual artisan maker. With their advanced social media skills and strong individual brand identities, their opportunities to connect with an appreciative and relevant global market are beyond the dreams of designers at a similar stage ten years ago.

Textile Futures and looking outward

High quality fabric choices in Brisbane are limited to two local boutique fabric retailers, with the remaining retailers offering a standard range of dress and upholstery fabrics. If students want unusual textures or fabric weaves, or even wholesale options, they must order online and ship from interstate or overseas at high cost, or otherwise fabricate the material themselves. Students respond to this limitation through working with available base fabrics and then developing their own surface embellishments.

It is vital for the students to touch, analyze and work with textiles in an effort to "reconnect" with the materiality of fashion versus the virtual or digital version of fashion consumed daily through the screens of their devic.

Living in Brisbane, a city that may be a "second-tier" or even "third-tier" fashion city, has prompted creative and inventive ways to explore materials, despite the lack of manufacturing and production networks that Sydney or Melbourne designers may enjoy. Examples of successful Brisbane-based labels may be few but notable, such as Easton Pearson and Gail Sorronda, a QUT graduate. Li Edelkoort (2017), one of the most influential trend forecasters in the world, has spoken about the importance of textile knowledge in the fashion industry and fashion education. In her controversial manifesto "Anti-fashion 2015" in which Edelkoort (2017) stated that the fashion industry had become old-fashioned, one of the sole ways she sees the fashion industry maintaining relevance into the future is the focus on textiles. In her role in Parson's School of Design she is working towards hi-tech textiles in what she calls "Hudson valley meets Silicon Valley."

Li Edelkoort's (2017) strategic base in New York definitively allows her to connect with powerful textile and technological national industries, but in the case of QUT we are looking outward to other opportunities. Our location is remote in some ways, but strong in others, as we share a time zone and neighborhood with the fastest developing region in the planet, Southeast Asia.

Fashion Togetherness

This strategic geographic position enables diplomatic alignments between Australia and Asia, but from a fashion perspective, is an inspiring, powerful place for research and engagement projects for QUT School of Design in the region. In the postgraduate space, this has included PhD students working on projects in the fashion industries of Cambodia and Sri Lanka respectively. In engagement, two Australian Government funded programs have directly linked our fashion program with industry in Indonesia and South Korea with exchange of designers, trade diplomacy, and ultimately exposing the students to collaborate and learn in a bidirectional way. The exchange of knowledge ranges from the textile tradition of both Indonesian and Korean cultures, inspiring the students to engage in those textile and construction techniques, and also learn about other fashion industries, expanding the horizon of the students' career prospects to include these fashion markets of Cambodia, Sri Lanka, Indonesia and South Korea.

Whether working in big businesses or for themselves, a mindset directed towards creative experimentation is valuable in any endeavor, and will sustain the students. Looking ahead, the donation of the Easton Pearson archive to the Museum of Brisbane will allow students to study the designers' production methods, including their close collaborations with artisans locally and in India and Vietnam.

Cross-Cultural Collaborative Strategies

Two main strategies that include developing a robust portfolio of international industry engagement projects and embedding that in the curriculum lets the benefits trickle down all through the courses to the undergraduate programs. The strategies contain a suite of different projects specific to QUT in Brisbane but are shared within regional networks of fashion educators.

1. Portfolio of International Engagement

QUT School of Design has cultivated a robust portfolio of international engagement on the last years, with several Australian government programs, below we list a selection of projects,

In the first case, what originally started as a "The Immersive Asia Study Tour", it has become a fruitful international engagement project

between Australia and strategic Asian countries. Winning its second New Colombo Plan grant from the Australian Government, that will fund the project for the next three years, and linking with high level industry partners such as The Woolmark Company and Lane Crawford, this flagship project fosters interdisciplinary collaboration helping students learn how to utilize their own skills as well as the ones from their peers, helping to contextualize those skills in the landscape of a multidisciplinary collaborative project that they will present in situ to potential employers in their headquarters located in major Asian Design capitals such as Hong Kong, Seoul, Shenzen amongst others. In this year's project, the Fashion an



Figure 3. Students and academics collaborating in the 2017 QUT Immersive Asia Study Tour, present at the results of their co-design project between QUT, UNSW & PolyU at The Woolmark Company's Wool Resource Center in Hong Kong. Photograph: QUT Creative Industries.

Industrial Design students from Queensland University of Technology (QUT) collaborate with The Hong Kong Polytechnic University (HK PolyU) and University of New South Wales (UNSW) students to research, develop and present a proposed wearable technology product that portrays potential use Wool textiles in the future. The results are presented to industry at The Woolmark Company's Wool Resource Center in Hong Kong, followed by a networking event (see Figure 3).

In 2016 QUT Fashion lecturers Carla Van Lunn and Kay McMahon leafor ian Australia Awards (2017), an Australian Government scholarship/fellowship program for foreign nationals where Van Lhat mentors established Indonesian Fashion Designers on how to expand their markets in Australia through a year-long program in both Indonesia and Australia comprising workshops, lectures, visits, networking events and engagement with the Fashion Weeks of both countries (see Figure 4). Since its first iteration of this program at QUT run by Carla Van Lunn, it has gained great success and recognition in different spheres of both countries such as Trade, academia and also diplomacy. Under this program we have seen the raise of the concept of "Fashion Diplomacy" at QUT School of Design.



Figure 4. Carla Van Lunn (Left), leader of the Austrsian Awards program in 0167 at QUT in Brisbane, together wers(translator (cenght right) and designer Dani Paraswand (right) and a QUT student (center-right). Photograph: QUT Creative Industries.



Figure 5. Campaign for the latest iteration of the Australia-Korea Emerging Fashion Designers Exchange Program, where Australian and Korean Fashion designers take part in exchanges and collaboration to grow their businesses internationally. Photograph: QUT Creative Industries.

Based on the success of the Australia Awards we just described, QUT Fashion lecturer Melanie Finger in collaboration with the QUT Creative Industries Faculty Business Development Office succeeded in competing for anotFAT grant, Australia-Korea Emerging Fashion Designers Exchange Program (2017). This project builds on the knowledge and format from the Australia Awards in a much smaller scale and also includes Australian Designers together with the South Korean ones, in this case mentoring emerging designers in both nations looking to grow their businesses overseas. The year-long project includes activities during both Korean and Australian Fashion weeks and culminates with a showcase of the collaboration between the South Korean an Australian fashion designers (see Figure 5).

2. Embed/Bring that Cross-cultural engagement into the curriculum.

A cross-cultural angle in Studio units sets the tone for the QUT Fashion course, the artisanal design brief in second year design studio exposes students to global and local craft techniques, prompting reinvention and experimentation. Students are introduced to the textiles of our neighbors in Asia, for example, through viewing textile samples from India, Indone-

sia, Papua New Guinea, and Bangladesh, and experimenting with batik, block carving, and printing. Guest talks connect students to local and international textile designers, for instance, with Indigenous artist Elisa Jane Carmichael from the Quandamooka people of Stradbroke Island. Carmichael shares her art making informed by place and culture, and the weaving techniques developed into her Masters project at QUT (see Carmichael, n.d.). Through second and third years, student Isabel Wengert continually extends her hand weaving, deconstruction, and embroidery work, articulating a philosophy of fashion practice through engagement with cloth and materiality in her 2016 Honors project (Figure 6).

To maximize the impact of the international industry engagement suit of projects described on the First Strategy we find it is important to not limit them to the engagement and business development spheres but to bring them and spread the benefits of this initiatives across all university education layers of research, post-graduate and undergraduate courses in a Curriculum meets engagement meets real world into the classroom approach.



Figure 6. disfiGARMENT use of hand weaving, dyeing, deconstruction, and hand sewing 'to create fashion objects that evoke a sense of resourceful and thoughtful making,' Honors project, Isabel Wengert, 2016. Photograph: Savannah van der Niet.

A solid example is the student experience when the delegations of both the Australia Awards (2017) and the Australia-Korea Emerging Fashion Designers Exchange Program (2017) visit in the undergrad Fashion Design Studio for a series of collaborative workshops and talks, that allow the students to team-up with the international designers for a "hackathon" (see Figure 7) where they participate in understanding the Australian market and they co-design a product that would suit the designer's aesthetic and would be marketable in Australia. During the process, the students get to learn about the cultural differences between the countries of the designers and Australia and how those cultural differences affect the market realities in the context of the fashion industry.

The students grow their network with established and upcoming fashion designers that might potentially employ them or collaborate with them. Some direct outcomes include internship opportunities for the students, the inclusion of some of this companies in Study tours as well as exchanges with the collaborating institutions. The engagement projects have provided fantastic networking opportunities also for the academics allowing to forge new partnerships with higher education design institutions from different countries, some of those connections are already put to work in projects such as "QUTxNSU: A cross-cultural video dialogue" (see Figure 8) where the final year Fashion students of both Queensland University of Technology in Australia and Seoul national



Figure 7. QUT Fashion Design Studio students take part in a hands-on workshop with Indonesian designers. Photograph: QUT Creative Industries.



Figure 8. Screen capture of video clip from Lauren Richardson, QUT Fashion Student, as a part of the collaboration between QUT and Seoul National University the fashion students of both institutions exchange views on their creative practice. Photograph: QUT Creative Industries.

University in South Korea collaborate through a series of digital videos that allows them to exchange views and reflections on their own creative practice and how it relates to their markets in a cross-cultural context.

This Cultural Video-Dialogue with Seoul National University nicely closes the current suite of cross-cultural engagement collaborative projects embed in the QUT Fashion Curriculum, that starts with Inter-cultural exploration of materials and textiles in the early years of studies and continues scaffolding through exposure to international businesses and culminates in the international video-dialogue mentioned above.

We find that the suites of projects that make the two main strategies for cross-cultural collaboration at QUT Fashion do complement each other in their approach and impact allowing bi-directional cultural awareness through the course.

The design curriculum is alive with new projects and opportunities as they keep on arising, including new collaborative strategies in making, thinking and doing fashion that may be specific to one's own place but are shared within regional networks of fashion educators. As mentioned before, the first one of those strategies being the development of a solid portfolio of international engagement projects (e.g. Immersive Asia

Study Tour in Hong Kong, programs for trade and cultural exchange) and the second being the integration of that engagement in the curriculum (e.g. textile and cultural studies, workshops with the foreign designers and the video-dialogue).

To conclude we would like to add that although there are limited opportunities in the local fashion industry, our students can think differently about career options, whether looking to Asia or staying resolutely in place. Their inventiveness as students can be extended to propel them forward as niche, local, artisanal and creative entrepreneurs – following a path forged by Easton Pearson and Gail Sorronda. They can create their own storytelling, making methods, and textiles that speak of their own place in the world, that being a more inclusive culturally and professionally thanks to the awareness acquired through the QUT Fashion curriculum that understands the "New local" for Australia is the Asia-Pacific region.

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Alice Payne
Senior Lecturer Fashion,
Queensland University of Technology,
a1.payne@qut.edu.au

Icaro Ibanez-Arricivita
Lecturer Fashion,
Queensland University of Technology,
icaro.ibanezarricivita@qut.edu.au

Lydia Pearson
Lecturer Fashion,
Queensland University of Technology,
lydia.pearson@qut.edu.au

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Relevance of Renaissance Architectural Theories Today: Together?

Renata Jadresin Milic, Annabel Pretty

Abstract

This paper will strive to identify and analyse the multiplicity of threaded knots which lurk under the surface of a mythologised Renaissance as characterised by monolithic classicism and untangling this to create a shared understanding or language.

The first lens which makes Renaissance theoretical discussions relevant today is that of the establishment of general surveying: Since the Renaissance, architects have been methodically developing the discipline of surveying to understand their present-day paradigm. They sought the "Knowledge" to solve contemporary problems albeit that many of these are derived from personal aesthetic and architectural interests: Palladio intensively surveyed classical Roman temples to learn from them, to understand the Greeks knowledge of the visual representation as recorded by the eye to remediate it such that it is perceived as being correctly proportioned.

The many theoretical statements as espoused in their treatises indicate that often as not they did not believe in the idea that an architect or an artist should work with the notion of pursuing an ideal progress in architecture. A sincere belief in the constant transformation of the structure, its architectural elements and details, was independent of the previous ideas. People naturally have been learning from each other since time immemorial, in the past and the present together: correcting old mistakes and making new ones for next generations to resolve that which connects them with the Renaissance paradigm.

The second lens which makes Renaissance theoretical discussions relevant today is that of the fundamental mechanism of representation of a building via the notion of "drawing": the discovery of perspective and different visual examinations (orthographic drawings and / or axonometric). This new awareness of a geometrical nature of visual experience, and capability to mechanically reproduce images, is one which during the discourse of the Fifteen and Sixteenth Century resulted from the new awareness of the nature of visual experience.

In that sense, Renaissance theoretical debates are very actual and relevant to contemporary architectural issues. Today's interests of architects turn towards visual awareness in architecture, and, as a result of an influx of the digital revolution, discovering new tools

for exploring spatial characteristics of architecture has become the primary preoccupation of the profession: Together?

Theme: Language
Keywords: architecture, drawing, spatial concepts, renaissance, visual awareness

1. Introduction

This paper stems from the current and ongoing discourse between architects, architectural historians, and architectural students/schools – around the role of architectural history in architectural design and professional practice today. It is motivated and inspired by questions regarding a need for a shared language between architectural history and contemporary architecture (architectural design and practice) which defines the scope of the paper, that of togetherness. The mechanism or vehicle which has been used to discuss this shared language between the past and the present is to use a variety of Renaissance theoretical viewpoints. The method by which this will manifest itself will use the hypotheses of two case studies, which show the possible applications. It can be postulated that the intersections between academic architectural history (delivered in architectural schools around the world) and the design professional practice has been seen as bifurcated into two distinct disciplines as evidenced within the discourse of Society of Architectural Historians (SAH 2018). The hypothesis that these two fields of the architectural discipline need to work together and the reasoning for shared language between past and present will be examined/underlined/revealed. More widely, we seek the means to strengthen the role of architectural history in architectural schools and architectural practice. To explore and define the subject more closely, in this paper, we will deal with questions of:

- How can we inspire dialogue, collaboration, and assimilation between academia and design professions?
- How might the theoretical methodologies gained from an understanding of history, historical processes, and research problem solving serve architectural design and practice today?
- How can these investigations help in achieving the first two points as to the role of a pre-twentieth century work on architectural history, its legacy, and the importance of the design experience

conducted and rigorously explained in the early treatises and debates on architecture?

Most importantly, we are interested to examine the pros and cons of challenging the established academic culture in the field of architectural history, and by reframing the disciplinary boundaries between design and historical practice – to possibly invigorate new practical application of the field and introduce a *shared understanding of language* between the past and the present in architecture.

2. Two Hypotheses: Of Shared Language between Renaissance Architectural Ideas and Contemporary Architecture

The Renaissance has been chosen as a metaphorical vehicle to discuss the connections between the history of architecture and contemporary architecture. The intention is not to have a unique contribution to scholarship on Renaissance, but rather to address the conference theme of *togetherness* through this case study of threefold relevance of Renaissance architectural theories today It is our belief that the three essential phenomena that occurred in the Renaissance can be identified as still operative today:

Firstly, social mechanisms that happened and were triggered in the Renaissance period – the Fifteenth Century in Italy can be described as unprecedented and unparalleled in human history; which, as a result, brought to the first globalised approach to architecture and architectural history. The fall of Constantinople and the resulting arrival of numerous Byzantine scholars to Italy in the Fifteenth Century brought Italian intellectuals into contact with ancient Greek philosophy and science, and they were inevitably influenced and encompassed by it.

Secondly, the invention of the printing press in Mid-Fifteenth century enabled the expansion of ideas, knowledge and learning on a scale that had been inconceivable in preceding years.

Thirdly, the expansion of developed urban environments – cities and towns that were developed during that period – as well as the presence of universities providing a fertile ground for considerable intellectual exchange and discourse. All this gradually led to the re-examination and understanding of the dominant worldview. (Mitrovic 2011 P64)

2.1 Discipline of Surveying – First Hypothesis: Making Renaissance Theoretical Discussions Relevant Today: Surveying – Learning from the Past.

Since the Renaissance, architects have been systematically developing the discipline of surveying and the analysis of historical architecture in order to learn from it. A choice of buildings and details for research and survey was based on personal aesthetic and architectural interest. Palladio intensively surveyed classical Roman temples to learn from them, and surveying (with more precise tools though) still have been one approach and part of the architectural history discipline today.

In the Fifteenth and Sixteenth centuries in Italy, a number of theoretical treatises on architecture were developed and postulated. Their importance for the overall development of theoretical thinking on architecture was varied. Texts are written differently, can be interpreted variously and even read with varying degrees of success. In accordance to that, keeping track of different approaches to architectural history and learning from it in Renaissance architectural treatises, also show shifts, changes and developments. Leon Battista Alberti, wrote the first theoretical treatise in Latin, with many theoretical notions which are often hard to interpret (Alberti, Leoni, & Rykwert, 1955) (Alberti, Leach, Rykwert, & Tavernor 1988). Sebastiano Serlio's opus of seven separate books and the *Libro Extraordinario* was a practical manual and the first textbook for an architect-practitioner (Serlio, Hart, & Hicks, 1996 & 2001). Finally, Andrea Palladio's *I Quattro libri dell' architettura* offers a theory based on his practical experience as an architect (Palladio, Tavernor, Schofield 1997). The sum of these treaties indicates that each author writes in an individualistic manner and their writings answer to different stimuli that could have been mutual for that specific time. Thus, the Renaissance should not be perceived as a period in history that presents a coherent state of mind of individuals, but rather as a pastiche somewhat analogous of the modern-day *Joseph and the Amazing Technicolour Dreamcoat*.

However, a specific attitude toward architectural history and historical periods, as well as an idea of the spirit of the times (*Zeitgeist)* seems to be a common thread that runs through the writings of Renaissance authors and characterises their written and practical work in architecture. It appears that they did not believe in the idea that an architect or an artist should work with the concept of the pursuit of ideal progress in architecture. It also seems that they believed genuinely in the constant transformation of Architecture, architectural elements and its details,

that were independent of the previous ideas, and that were always present. People have naturally been learning from each other continuously correcting old mistakes and making new adjustments and substitution.

Alberti's architectural theory was a systematic application of a more comprehensive humanist programme which formulated architecture as a study of the minds capability to enjoy specific forms (shapes) and to produce them. The approach that forms can be appreciated no matter what is thought about them conceptually has been known since Aristotle (Mitrovic 2011 P42–55). Alberti separated the naming of things from the judgment of their beauty, which is based only on the visual pleasure in observation of a specific form. In that sense, not only was he the first architectural theorist of modern times but also the first advocate of form in architecture. (Jadresin Milic 2014). Alberti believes that individual architects possess the same cognitive capacities, including the capability of aesthetic judgement and evaluation, which means that they can learn one from another even when different time periods divide them. His attitude to history expressed in the Sixth Book of his treatise is a result of that approach. Alberti sees the history as a constant progress, based on the learning about architecture from predecessors. Alberti's writings on architecture thus reveal his belief in the intuitive capability of an architect to perfect architecture over time by continuous study of proceeding works often in Architectural terms known today as *Precedent Studies* or *Precedent Exemplars*. He draws the reader's attention to how the Ancient Greeks examined and studied formal elements of architecture and how their predecessors solved practical architectural problems. They subsequently changed those elements, adopting them to their own needs and according to their inner sense of good architecture. (Battista, Leach, Rykwert, and Tavernor 1988 VI.3, 158). It is evident that from Alberti's perspective architects can and should learn from each other even if different time periods divide them. The result is the picture of architectural history as a constant process of perfecting or improving, based on the learning from the past.

Published in 1570 Palladio's *I quattro libri dell'architettura* was a different type of treatise. During the Fifteen centuries, the character of architectural treatises had been literary and humanistic. In the Sixteenth century, however, it became more strictly architectural with an emphasis on illustrations. Palladio based his theoretical ideas on colossal architectural practice. For Palladio, nothing, not even the history itself, was the absolute authority. However, he had an urge to illuminate the field of architec-

ture so that those who *"come after ourselves can use our example and their intellectual sharpness, and easily supplement the magnificence of their buildings with the sincere beauty and elegance of antique"* (Palladio, Tavernor, Schofield 1997 P3). It is evident that Palladio believed in constant study and intimate evaluation of antiquity to reach conclusions about the ways the principles can be applied in the contemporary environment.

Palladio's specific, active, engaged and dialectic relationships towards history is apparent throughout his second book. He often writes about experiences inherited from the history of architecture (Palladio, Tavernor, Schofield 1997 P75–158). However, to prove the point of such an assertion, he simultaneously presents his architectural works as examples of good practice and application of those experiences. Likewise, the way in which Palladio presents classical temples reveals his idealisation of history to a certain extent. Namely, in his numerous reconstructions of classical temples in the fourth book, which appeared as a result of his surveying on the terrain and the basis of his knowledge of Vitruvius, all temples were presented as ideal reconstructions. Palladio obviously wanted to revive a perfect image of their architecture.

2.2 Renaissance Architectural Practice – Application of the 'Ideal'

Similarly, as they expressed theoretical ideas differently, the way in which Renaissance architects achieved that detachment between forms and their meanings in practice differs significantly. One of the most common problems to be considered in their architectural practice was: how to apply the ideal image of the classical temple facade to a Christian basilica building that they had designed. A Classical temple's simple *cella* (central space of ancient Greek and Romans temples) spatial structure with free-standing columns which bear the tympanum, should have been "*applied*" to a three naves structure spatial organisation with at least two different heights of those spaces – a high central nave with a lower aisle on either side. The attempt of Renaissance architects to modify the facade of a single – volume buildings to the nave-and-aisles plan of Christian churches and architectural treatment of such a building frontage was an authentic and utterly new problem. (Beltramini 2008 P231) Thus, succeeding to get the main entrance that does have the dignity of a classical temple was not an easy task to solve. Renaissance architects who did have such a commission came out with divergent approaches and solutions.

Alberti's first architectural assignment was *Tempio Malatestiano* – the adaptation of the medieval San Francesco church in Rimini for the Sigismondo Malatesta, the ruler of Rimini who commissioned a mausoleum for his family. The building is also known as the first modern example of a classical solution to the problem of the western façade of a Christian church. The awkward shape thus produced was not a typical classical form. Alberti designed a west façade as a combination of a classical temple and a classical triumphal Arch. The fact that *Tempio Malatestiano* was dedicated to the glory of an earthly ruler may suggest the solution adopted. The choice of a triumphal arch for the church entrance symbolises the idea of victory over death and shows that Alberti applied a powerful meaning to the architectural form that he designed. Alberti was undoubtedly primarily interested in form and how to apply it correctly in his architectural practice, but ideas that were symbolised by that application were of considerable importance to him.

Palladio's three Venice churches are a significant and entirely different response to the same architectural problem. Palladio's approach to their west facade incorporated two classical temples overlapping each other. He established a visual statement communicating the idea of two superimposed systems – two interlocking architectural orders. The solution apparently articulated and delineated a hierarchy of a larger one that symbolised higher, holy church overriding a smaller order that symbolised an earthly church. Palladio obviously worked with forms and meanings together here, seeing a church as a clear statement of the proper relationship between the physical and the spiritual worlds. To bring about compositional unity, Palladio had to employ different scales, he incorporated corresponding pediments of classical temple form into his design and resolved the divergent scales of nave and side aisles with a single architectural motif. One possible explanation for this solution is that Palladio was inspired by his drawings of antiquity where he combined section and elevation with orders of different magnitudes on the same sheet (Constant 1993 P98). However, whatever explanation is taken into account the strong symbolic meanings of the buildings is undeniable.

2.3 Second Hypothesis – Making Renaissance Theoretical Discussions Relevant Today: Visual Experience

Theoretical discussions of the Fifteen and Sixteenth century resulted from the new awareness of the geometrical nature of visual experience,

and the capability to mechanically reproduce images. Discovery of perspective and different visual examination influenced this process. In that sense Renaissance, theoretical debates are very actual and relevant for contemporary architecture since interests of architects turn towards visuality in architecture today; and, as a result of the digital revolution, discovering new tools for exploring spatial characteristics of architecture become the main preoccupation of the profession. Often in Renaissance treatises on architecture, there is an active dialectic between the words and the images. It mainly applies to Palladio's *I quattro libri dell'architettura* In the Preface of his book, Palladio says*: "And in all these books I shell avoid the superfluity of words, and simply give those directions that seem to me most necessary"* (Palladio, Tavernor & Schofield 1997 Preface).

Palladio tries to balance the two, but still often gives more significant attention to the visual and the drawings usually take the dominant role. Apart from that, it is essential to pay attention to how Palladio renders his drawings. He carefully uses the concept of the plan, the section and the elevation in such a way that the shape and size of individual architectural elements can be read consistently from each displayed format, and in accordance with geometrical rules. All facts on a given architectural element or a building fit at all levels, enabling the drawing to be read as a complete and consistent description of a given shape and form. Architects' imagination is required in this process to design the spatial relationship between different aspects of the building, as well as to understand the relationships between its plans, sections and different facades. (Mitrovic 2011 P39–41)

It can be read from the drawings in *I quattro libri dell'architettura* where Palladio uses orthogonal projections instead of perspective with a random choice of the viewing point. The plans, sections, and elevations thoroughly render the spatial system of each building. That approach is pushed to almost an abstraction of how different parts fit together when he presents classical orders and their details. From that point on, visual imagery plays a vital role in the creative process of an architect and gets its place in architectural education in schools of architecture around the world.

In his theoretical writings, Palladio does not advocate in favour of optical corrections, which makes him an exception among other architectural theorists of the Renaissance. Palladio believes that buildings should have the proper proportions, regardless of how they are perceived. Palladio often corrects Vitruvius's ratios by an infinitesimal degree, so the

correction could barely be observed. Palladio thus divorces architectural works the way they are perceived. This knowledge affected his approach to drawing and visual communication as well. He almost never used perspective drawings in his architectural representations. He developed a system of presentation that combined various orthogonal projections of architectural elements from different sides. In this way, he rendered their shapes and proportions accurately, although no architectural feature could ever be perceived that way.

3. Two Case Studies – Possible Application of That Shared Language in The Architectural Schools' Teaching Paradigm.

Most architecture schools around the world teach architectural history and architectural theory, and students devote a significant number of hours to meeting course demands. Unfortunately, however often students resist the courses on architectural history offered in their schools. The fact is that there is no general agreement between scholars and teachers of architectural history about *how* the content should be delivered, or what is the intended purpose of that knowledge. Renaissance generally, and in our case Palladio's mainly, believed that architectural history is relevant (in his time – the architecture of classical antiquity) insofar as it teaches architects how to design but with inclusion of their reasoning and common sense, can and should be seen (we believe) as validation for the teaching of architectural history in architecture schools today.

Reflecting on Renaissance theory and practice in the same way Renaissance architects used to learn from history, not by trying merely to emulate it, but rather to use it in a way relevant to students and their design studio tasks – is what our hypothesis proposes. As introduced within Architecture Department at Unitec Institute of Technology Architecture, Auckland and the Faculty of Architecture at Belgrade University. The approach attempts to avoid communicating basic descriptive facts; it is based on interpretations, an indication of personal reactions, setting up challenging cross comparisons and provoking discussions between students. In order to and with an aim to see knowledge of history from the distant to the recent past as help and prerequisite to the active practice of architecture in the Twenty-First century. Two teaching experience or case studies are presented here as an illustration of that approach.

3.1 Case Study – Shared Language: Quoting Renaissance Theoreticians' Words

Quoting Renaissance theoreticians' treaties in architectural history and theory classes has been used to initiate discussion and dialogue between students. Students are assigned to read certain parts of (for example) Palladio's treatises and to find quotes that provide insights into the design approach taken by Palladio in his architectural practice and illustrate how he solves particular design problems. The students are asked to find what and how Palladio argues about, firstly: context, functional, structural and aesthetic qualities of architecture he presents; and/or secondly, about: light, colour, transparency, illusionism, lightness, envelope, patterns, fluidity, re-use of architecture, use and re-use of materials in architecture, that have been in the focus of architectural debates today. They are expected to do so by quoting Palladio whenever he, according to their beliefs, talks for and /or against a particular topic which they are currently researching. In the next step, students discuss and reflect upon a significant issue in quotations they selected, with which they agree or disagree. Finally, they are expected to choose a current design project they have been working on in the studio and think about what attitudes regarding the particular topic might be evident in their work.

In this way, the knowledge gained from Palladio and quoting him has been approached as an ongoing dynamic process discoverable for oneself, rather than something that is handed down. This learning approach does not necessarily expect students to know every aspect of cultural history that stands behind the quoted words but instead gives them a freedom to use their common sense and opinion. From our experience, it encourages students' inventiveness in research and also raises their interest in reading other historical treatises as well. Those young future architects start to feel a need to know historical works, as written about and executed and to see an immediate application of that knowledge to their future work.

We saw that Palladio's historical research does not always deliver what it asserts or promises to achieve. His surveys are not entirely accurate, and the design principles he describes in the treatise do not correspond with and are not derived from the surveys of the historical buildings presented in Book Four. Having that in mind, it seems legitimate that analysing and clarifying different theoretical principles and ideas, as well as the relations between architectural theory and design practices

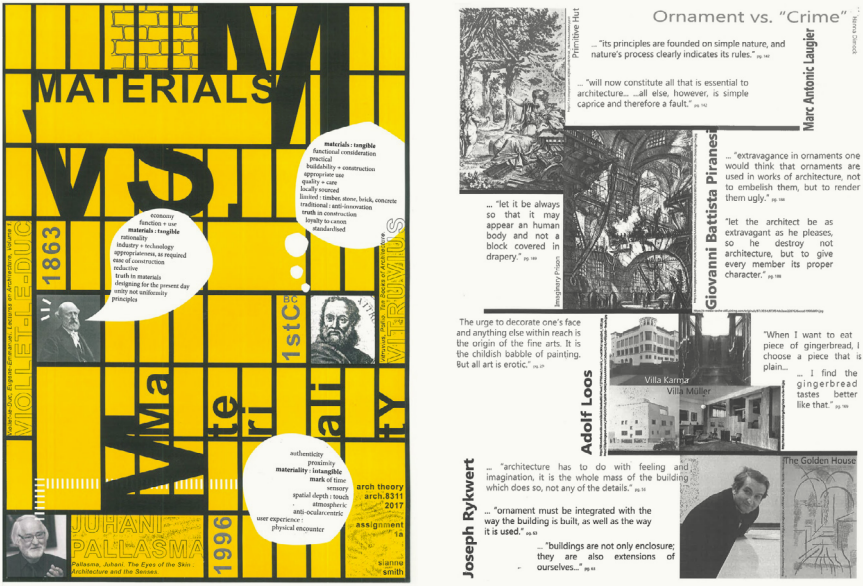


Figure 1. (LHS) Sianne Smith **Figure 2.** (RHS) Hanna Dimock: Master of Architecture (Professional), Unitec, Auckland; Course: ARCH 8311 Architectural Theory; Semester 2, 2017 Posters of the "Discussion Assignment" – a "visual reminder" for the verbal discussion in the course; key arguments, contra-arguments, evidences, and their relations in Architectural theory.

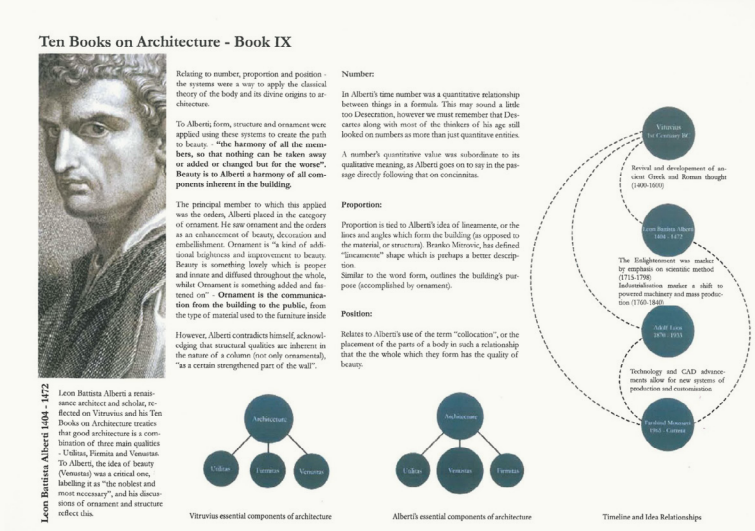


Figure 3. Alice Couchman Master of Architecture (Professional), Unitec, Auckland; Course: ARCH 8311 Architectural Theory; Semester 2, 2017 Posters of the "Discussion Assignment" – a "visual reminder" for the verbal discussion in the course; key arguments, contra-arguments, evidences, and their relations in Architectural theory

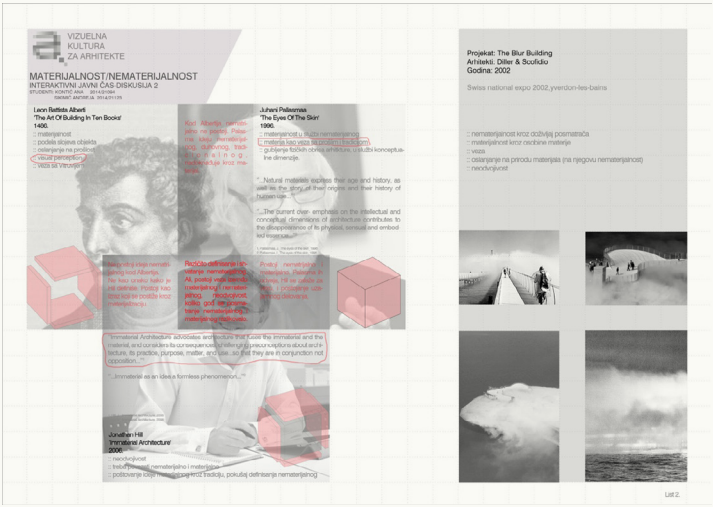


Figure 4. Ana Kontic & Andreja Sikimic Master studies in Architecture; Faculty of Architecture, Belgrade University; Course: MASA-11020-02: History and Theory 1: Visual Culture in Architectural Theory and Practice: Semester 1, 2015 and 2014:

throughout history, develop students' awareness of the history and theory of architecture importance for modern architectural design/practice.

3.2 Case Study – Shared Language: Quoting Renaissance Theoreticians' Drawings (Rendering/Presentation)

After being introduced to Palladio's architectural treatise and buildings, students at first-year Bachelor of Architectural Studies (BAS) in Architectural History course, are assigned to make hard-line architectural drawings in proper scale (plan, cross-section, elevation, details, etc.) of one building that students have been exploring throughout the semester. We believe that it is important for architecture students to learn all about the process of drawing as soon as possible, to understand it as an essential representational tool of architectural design. First-year students will gradually move from understanding architectural drawing as *analytical devices* used to depict existing buildings, to seeing architectural drawings as *generative instruments* for their design studio solutions and future architectural practice.

Page layout of the assignment is also an important aspect since it reveals/shows how those architectural drawings should and can be combined in one sheet of paper to result in a good and successful composi-

tion. The way in which the students integrate drawings with titles is also an aspect connected to their design decision making, which they have been learning continuously through all courses at the first-year level.

Later, in the second and third year levels at BAS through Architectural Representation and Critical Studies courses, as well as elective courses (Analytical Drawing et al) – the aim of these courses has been to research principles and procedures of graphic representation of architectural forms / shapes through two-dimensional (sometimes three-dimensional) drawings, with application of learning achieved through Design studio assignments and Architectural History course. Students are assigned to draw architectural drawings of their designs and combine them in scale and orthogonal projections in a way learnt from Palladio's drawings. Final posters of the assignment have an aim to develop gradually

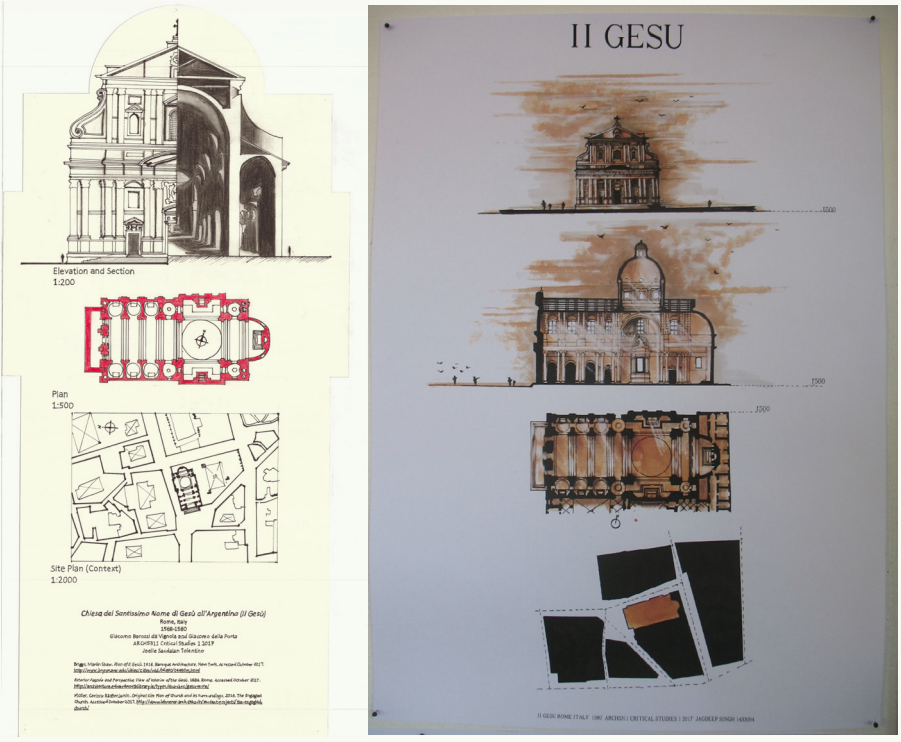


Figure 5. (LHS) Joelle Sacdalan Tolentino & **Figure 6** (RHS) Jagdeep Singh Bachelor of Architectural Studies; Unitec, Auckland; Course: ARCH5311 – Critical Studies 1; Semester 2, 2017 and 2016; Posters of the "Drawing Assignment" – the third part of the "Major" assignment, based in the study of a significant building from a period covered within the course.

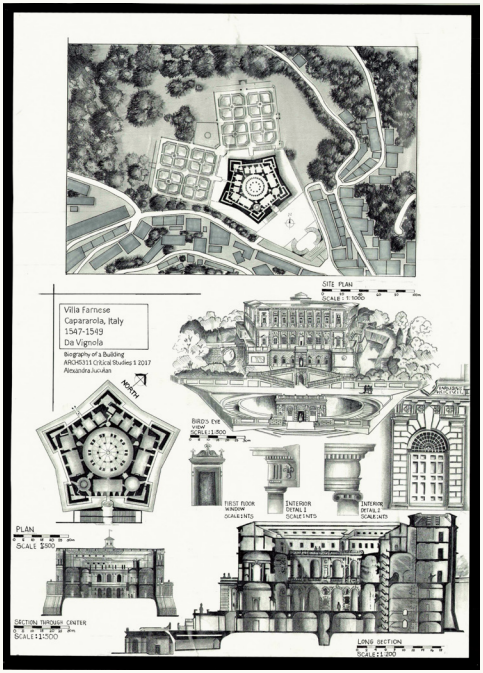


Figure 7. Alexandra Jucutan Bachelor of Architectural Studies; Unitec, Auckland; Course: ARCH5311 – Critical Studies 1; Semester 2, 2017 and 2016; Posters of the "Drawing Assignment" – the third part of the "Major" assignment, based in the study of a significant building from a period covered within the course.

and permanently analytical, creative and practical skills necessary for active comprehension and participation of students in visual research process.

4. Conclusion

Historical facts are necessarily wrapped in a particular kind of interpretive storytelling, which lends historical narrative the means to move beyond the facts to grasp the present and invent the near future. Can we determine the kinds of questions that the "present" can ask of architecture's history? Can we "put past in practice" and start asking questions of the past and speculate about the implications of both past and present for the future, instead of only developing methods that deeply privilege narrative? Can students generate "spatial stories" from drawings so that we can bring architecture and history into mutual speculation?

The case studies with the teaching experience presented in the paper are connected directly to the argument that young architects should study the historical works of architecture as architectural works, or more directly: architectural history is relevant insofar as it teaches young architects how to design. It resulted from interviews with established Architectural history/theory and Design studio teachers, done as parts of the two international Conferences organised by the Faculty of Architecture in Belgrade in 2013 and 2014. (Jadresin Milic 2013, 2015) To find out about up-to-date approaches to teaching architectural history and theory in prestigious architecture schools today, questions were asked such as: How we should interpret Palladio's or Alberti's design principles? And: Is there any logic in the application of those principles in architectural practice today, so that students can see the benefit of their studio tasks?

However, there is not an exact, precise answer as to this formula. Advice has usually been that Palladio, Alberti, or architectural history/ theory generally, has been taught/ or should be taught in a way that is relevant as a "key for interpreting the present moment" (Jadresin Milic 2015). The way in which the knowledge is presented to architecture students should not be that the students are assigned to study the architectural historians' canon of buildings particularly significant to them in particular epochs of historical time. But instead to help them learn something that they experience and trust as having an immediate purpose to them (Jadresin Milic 2013). Students should not be just obliged to knowing things as far as possible, but rather to experience architecture, historical and contemporary together.

Renata Jadresin Milic
Senior Lecturer Architecture
Unitec Institute of Technology,
rjadresinmilic@unitec.ac.nz

Annabel Pretty
Senior Lecturer Architecture
Unitec Institute of Technology,
apretty@unitec.ac.nz

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The Demolishers Manifesto

What remains of the beauty

Silvana Kühtz, Chiara Rizzi

Abstract

This research project investigates the possibility of developing a multidisciplinary tool to demolish ugly buildings and get rid of what is inhospitable, unattractive and a burden on society. This subject stems from the present debate on the use of soil, consumption of land, and on the selective intervention on the built stock and urban landscape.

The investigation started on questioning the reasons behind the habit of keeping rusty, ugly and inhospitable structures in place, instead of demolishing them.

We developed the DEMOLISHERS MANIFESTO as a Decalogue conceived to break the taboo, particularly rooted in Italy, around the concept of "demolition". The Manifesto highlights the possibility of demolishing the ugly wherever it occurs, develops an original vision to care for beauty and represents a provocative framework for inspiration and action.

The starting point is: 1. we demolish the UGLY, the INCONSISTENT, the INHOSPITABLE. The Decalogue starts off as a suggestion to demolish ugly buildings, houses, squares and it expands on a metaphoric inspirational level, suggesting to demolish attitudes like resignation, irresponsibility, cynicism.

In fact it ends with: 10. we pursue the beauty of resonance between community and territory.

We are surrounded by ugly urban landscapes. Distinguish them is a first step to recover landscapes beauty and poetry. We propose to demolish the ugly starting with the recognition of beauty. Affirming the necessity of demolition implies affirming a need to return to conflict as a condition that generates culture and innovation. This work (in progress at the moment) is the natural prosecution of these experiences: Poetry in action (born in 2005, involves amongst other things urban actions with readings and poetry sharing, spread in several Italian cities), Walking on the line and This is (not) a landscape started in Matera in the Department of European and Mediterranean Cultures since 2012.

The research is developing along these axes:
Aesthetic: Beautification – restoration of beauty, demand for participation, responsibility of citizens, risk reduction.
Social: Enable participative dynamics.
Sustainable: Reduce land/energy consumption, improve housing performance and intervene sustainably.

Economic: Analysis of methods and estimates of real estate property. Creation of models with wealth generation for private property, developers and the community, tax exemptions.
Regulatory: Reuse and densify built areas and demarcate city borders.

Theme: Language
Keywords: demolition, beauty, dystopia, landscape, void

1. What is beauty

The changed national and international scenario requires a rethinking of everything we thought familiar and immutable. New cultural and development models have come forward, favoured by the enormous acceleration of new technologies and hyper-connectivity, but also by the movement of large numbers of people across borders divides.

The news show us terrible scenes of war, famine, despair but also the ravaging of ancient monuments of inestimable value, the theme of cultural heritage has thus become more and more pressing together with the social issues. The 2005 Faro Convention underpinned cultural heritage as the centre of local community life and the 2013 HangZhou Unesco Declaration identified it as the pillar of economic, social and environmental sustainability.

The study Cultural heritage counts for Europe promoted by the European community and presented in Brussels in 2015 showed how cultural heritage is also central to the processes of production of value. It does not refer only to revenues generated by the flows of paying public or of cultural tourism, but also to its contribution to continuous social innovation. The focus is not only on tangible and physical assets, but also on the intangible ones.

Thoughts and beliefs from very different historical and geographical contexts confront each other more and more often, therefore we asked ourselves whether the cultural values and ideals we have relied on in the last century are also somehow changing. In the light of modernity and uncertainty we have probably to redefine and reaffirm what we could have taken for granted during the second half of the twentieth century.

Can we say out loud and honestly what we think is ugly? Can we get rid of ugliness in our cities?

Is the concept of beauty conform to a fashion or does it belong to something deeper?

Is it really subjective? What is Beauty? What remains of the Beauty, then?

The concept of beauty is a long-standing philosophical issue that does not have a definitive answer. We do not think we could exhaust and tackle it once and for all, but we think that these are questions that can give incentives for personal social and contextual improvement and reflection. This research is first of all composed of questions, we want to trigger discussions and queries rather than provide ultimate answers/solutions.

> Be patient towards all that is unresolved in your heart. Strive to love the questions themselves, each like a room that is locked in, like a book written in a foreign language. For the moment do not look for answers that cannot be given to you because you would not know how to put them into practice, how to "live them". The point is to live everything. Live just your questions for the moment. Perhaps simply by living them, you will imperceptibly end up entering, one day, into the answers. – *Rainer Maria Rilke 16 July 1903* (Rilke 1939 pp.42–43)

One of the aims of this research project, is to investigate the current conditions through the concept of beauty, referring to what it means on an individual and more global level.

We list some definitions of beauty written by very different authors that seemed useful to kick off the discussion.

Aristotle proposed that moral virtue shared characteristics with good works of art. The doctrine of the relative mean – nothing in excess inscribed on the temple of Apollo at Delphi – survived to these days as a strong cultural notion. Perceived as universally good the concept of beauty is one of the most deeply ingrained and naturalized cultural notions.

Nevertheless beauty is a complex category, that risks to boost a Western concept of cultural arrogance.

Dubuffet in 1951 wrote: "Western man believes that his mind is capable of acquiring a perfect knowledge of things. He strongly believes that the principles of his reason and especially those of his logic are well founded. (...) I do not believe that the best part of mental functioning is to be found in ideas. Western culture dotes on analysis, but I have little confidence in it. People think that everything can be revealed by disassembling and dissecting all the parts and then study each individual one. I believe very strongly that an inventory of parts does not render an account to the whole. When I see a tree in the country, I don't transport it back to my lab to look at it, because I feel that the wind blowing on the leaves is crucial to any

knowledge of the tree and cannot be subtracted. (...) The western notion of beauty: for most western people there are objects that are beautiful and others that are ugly; there are beautiful people and ugly people, beautiful places and ugly ones. But not for me. Beauty does not enter into the picture for me. I consider this notion of beauty completely erroneous. I absolutely refuse to accept the idea that there are ugly people and ugly objects (...) no one doubts that beauty exists, but it differs from one person to the other. (...) if we came to realize that any object in the world may fascinate and illuminate someone, we would be in much better shape".

"A traditional idea basic to the modernist way of looking at art held that the activity of contemplating beautiful artworks is somehow innately ennobling, and thus all of society is incrementally improved.

The problem is that history does not prove this. Many of the leading Nazi power figures, for example, were aesthetes who collected art and were highly sensitive to its modes of stimulation, but their devotion of beauty seems to have had no effect whatever on the way they related to society, the smooth aesthetic facades acting as a cover-up of social reality" McEvilley 1998 pp 31–32.

> "Beauty is truth, truth beauty, – that is all
> Ye know on earth, and all ye need to know. "
> – *John Keats, Ode on a Grecian Urn*

Nobody knows what beauty is.

> "Hideousness and beauty are contained within each other. This prodigious paradox, in all its absurdity, leavens life itself, and in art makes that wholeness in which harmony and tension are unified. (...) The beautiful is hidden from the eyes of those who are not searching for the truth, for whom it is contra-indicated."
> – *Tarkovsky 1986 pp. 38, 42*

> "I noticed that beauty like happiness is common. Not a day goes by without living for a moment in paradise". – *Jorge Luis Borges*

> "I remember an old woman who lived in a small house with herbs and flowers planted under the wall. She sat in front of the window waiting for the moon to pass. When the full moon appeared, she applauded." – *Tonino Guerra*

Beauty is one of the three pillars of architecture. Vitruvius in his treatise on Architecture published around year 20 b.C. underlined that an architect should focus on three central themes when designing a building: *firmitas* (strength), *utilitas* (functionality), and *venustas* (beauty) that is the harmony of different parts established through the use of rules. The relationship between these components has always been the core of the architectural debate. "Beauty is a beautiful idea" is a tautology often used by Renzo Piano to describe the complexity of the theme. The concept of beauty is now the subject of multiple, various and also opposite hypothesis. "A Babel situation, in which every formal solution is virtually practiced (...). The upgrade of everyday thinks (...) to artworks, but also of random events (...), shifts the aim of the avant-gardes from the quality of the **object** in itself to the **process**, in other words from the formal to the conceptual (...) (Corbellini 2015 p. 106)

In contemporary architecture we are looking for the beauty not in the harmonious balance of the Vitruvian triad. The contemporary architectures have "their particular *beauty* in the dynamic, open and surprising intelligence of original creative processes and in the ability to interact with unstable contexts of contemporaneity." (Corbellini 2015 p.109)

Today we are surrounded by ugly urban landscapes. Distinguishing them is a first step to recover beauty and poetry of places.

How to distinguish them? As Borges wrote in 1977 "For me, beauty is a physical sensation, something we feel with our whole body. It is not the result of judgement. We do not arrive at it by way of rules. We either feel beauty or we don't."

It is comforting the idea to preserve everything, it gives us security, relieves us from the responsibility of saying that there are things that should not be handed down, as they no longer make sense. But we should be able to take responsibility.

2. The Italian condition

In Italy, little or nothing is ever demolished. Although there are no complete data on this subject it is not difficult to support this statement. According to the Italian Land Agency (Agenzia del Territorio) in our country there are 1.2 million illegal buildings. (source: CRESME which is an Economic and Social Research Center of the Building Market). It is a very "silent and neglected, but impressive emergency. It first disfigures the territory, then clogs the courtrooms" (Uva, 2015).

Despite the demolition orders, only 10% of the illegal buildings are actually demolished (Source: Legambiente, that is an Italian environmentalist association). It isn't an economic issue: there is a special national fund for demolition of illegal building but only 55% of available funds have been used. It isn't an issue of governance: since 2009 there is an agreement between the Ministry of Cultural Heritage and the Ministry of Defence about the fight against illegal building.

Why, then, is it so difficult in Italy to demolish, even in cases where the building has been declared illegal? There are many reasons and often they are not easy to decode. In addition to reasons linked to the world of crime, there are certainly cultural, anthropological, and even disciplinary reasons.

Architecture and urban planning are ontologically constructive disciplines. In the twentieth century the history of the city was dominated by the paradigm of a linear growth. Fordism, applied to architecture and the city, has produced a hypertrophy of urban settlements that we still do not manage. In recent years, cities have grown dramatically. From 1999 to 2009 about 300 million cubic meters/year were realized. From 1990 to 2005 about 3.5 million hectares were transformed (the same size as the sum of two Italian regions: Lazio and Abruzzo). In Italy there are over 200 thousand km of road network, 6000 km of disused railway line and 27 million houses 20% of which are not occupied (Ricci, 2013).

The numbers clearly show an "over-fill" made of sheds, houses, shops, factories, military areas, places of culture and leisure, infrastructures and settlements of different kinds, that have in common only their state of abandonment.

It is, in fact, only an apparent fullness. In their dual nature of *fullness of volume* and *void of meaning* there is the possibility of imagining a new metabolism for the post metropolitan city, postmetropolis (Soja 1999).

By recovering the definition of *terrain vague* by Ignasi de Solà-Morales, it is possible to redefine architecture of *drosscape* (Berger, 2006) as a medium, as transitional spaces between what are not (or no longer) and what they can become. Alan Berger uses the neologism *drosscape* to define waste landscape. It is a new word and aesthetic that could be useful for "adaptively reusing this waste landscape figures to become one of the 21st century's great infrastructural design challenges" (Berger 2006 p. 199).

The double Latin root, *vacuus* and *vagus*, of the word vague and the use of the French word *terrain* rather than the English one, land, suggest a condition in which abandonment becomes the main field of action and

emptiness the raw material of the architectural and urban project. This is a paradigm shift similar to the one that John Cage did with the composition *4'33''*. In this case, the void becomes concrete in the absence of sound, in a pause marked by precise timing, it becomes the space-time of new perceptive, ethical and aesthetic possibilities. But the void is only apparent, because in it the true creative act is realized.

In the urban framework, from urbanism to urban sociology and architecture, the phenomenon linked to emptiness as raw material for the construction of new possibilities depends on the definition of practices and tools of what we can define as " widespread and shared regeneration". The age of big urban plans and transformations is finished. Innovative, open and creative regeneration practices are emerging. These practices define a geography of micro actions that, with different scales and intensities, reshape coordinates of a change that is taking place. Essentially this change is carried out by the application of a recycling strategy.

The first survey of this phenomenon is due to the exhibition *Re-cycle. Strategies for Architecture, City and Planet* held at the National Museum of Arts of the Twentyfirst Century (called MAXXI) in Rome in 2011. In the following years the theme of recycling became central in the debate on the city and the landscape, in Italy and elsewhere. For example it was the main theme of the German pavilion of Venice Biennale of Architecture (2012), entitled *Reduce Reuse Recycle*, and of the research *Recycler l'urbain*. In Italy the research that has dealt with this topic in a more organic way and with a transdisciplinary approach has been the research *Re-cycle Italy* (2013–2016) funded by the Italian Ministry of University and Research (relevant national interest projects – PRIN).

The conceptual elaboration of recycling as a "third way", as an alternative to both conservation and demolition, has highlighted at least two important aspects to help us elaborate our reasoning. The first concerns the current redefinition of the meaning of heritage, the second, closely related to the first one, refers to the theme of demolition as a completely neglected option in the processes of urban regeneration.

3. Demolition as option

Usually demolition is not considered an option. It is a sort of transitional condition for a subsequent phase of construction. Immediately afterwards, especially when it comes to the demolition of buildings included in a continuous urban fabric, the *lacuna* has the connotation of a waiting space,

because inevitably a demolition is the prerequisite for a new construction (Ieva et al. 2013).

The need to define a theory of demolition as a tool for regeneration of the city and the landscape was brought to the attention of the international debate in 2010 by the Office for Metropolitan Architecture (OMA), directed by the architect Rem Koolhaas (2011). Koolhaas with this project, *Cronocaos*, confronts us with one deep cultural hypocrisy: it is decided to maintain the profile, the shape, even the skin of a building by accepting, however, that the function, what there is behind may change, even radically. In this hypocrisy the Dutch archistar recognizes one fundamental drift of our culture, that takes refuge, in many cases, behind the aura of an alleged intellectual integrity. In the age of *Cronocaos* everything we inhabit should be safeguarded and the tendency to preserve any architecture is constantly growing. Koolhaas claims that a huge section of our world (about 12 percent) is now off-limits.

Giving up on the idea to select produces a general impoverishment of the collective capacity to have a critical approach to the theme of memory and opens the field to all kinds of speculation and exploitation. This happened in some of the "excellent demolitions" that occurred in Italy in recent years.

The central dairy in Pescara (1932) was demolished in 2010; the cinema Armenise (1950) and the contemporary Cinema Ambasciatori, both demolished in Bari, respectively in 2016 and 2017; the Palazzo Sirena in Francavilla al Mare in Abruzzo (1888–1943–1992) partially demolished in 2017; are just some of the most recent examples. Amongst these there is also the event regarding the demolition of the building in Via Ticino 3, in the Coppedè district in Rome. This is perhaps the most paradigmatic case. Although the building had been included in the Charter of Quality of the new Plan of Rome, a tool to protect the city's urban fabric, in October 2017 it was demolished and it will be replaced by an extra-luxury residential building designed without any reference to its context. The history of this art nouveau villa contains in itself all the issues emerging from a general lack of "demolition culture" with the result that the beauty is cancelled out and the "the ugly, the incoherent, the inhospitable" (as in our Manifesto), preserved.

Interventions of protection and conservation are supported by a substantially consolidated literature and culture, on the contrary, the choices that regulate the demolition processes, are often based on distinct assessments and driven by personal choices, are less in-depth and more arbi-

trary, without references to clear and shared categories with which identify what to discard, what to delete (Menzietti, 2017 p. 147–148).

The Manifesto we propose here is therefore a working outline to overcome this cultural gap between preservation and demolition and to define demolition as a tool of urban regeneration and a practice to reclaim beauty.

4. Void as a generator of beauty? The Demolishers Manifesto

As hinted in previous paragraphs we can distinguish two types of void: there are demolitions that become a black hole, and drain energy, others that may become generative. We praise demolition when it is a possibility to open up a void that ends up making sense.

Speaking about contemporary societies, Miguel Benasayag and Angélique del Rey argue that the removal of the conflict can lead to barbarism. To explain their "Praise of Conflict" they refer to Heraclitus, who wrote "Polemos, conflict, is the father of all things." To affirm the necessity of demolition means to affirm a need to return to conflict as a condition generating culture and innovation (Benasyag, del Rey 2008).

A useful question, in this connection, may be: When does a void generate beauty?

We think that this happens when it goes beyond the demolition, when it gives us the possibility to recognise the value and beauty to be, when the void therefore acts as a pause and gives time and space for meaning.

Moreover, we consider it fruitful when instead of demolishing we transform a place and make it hospitable.

Sebregondi (2011 pag. 10) posed the following interesting questions: "How can architecture truly involve the community in its discussion and discussion? How can it open a field for transforming one's conditions of life through the creation and recreation of its spaces? (...) What is the subversive potential of a void? And since the appearance of a temporary void tends to be a constant within the pattern of urban regenerations, could we start thinking these voids together: as places from which to question, perhaps reinvent, the inherited axioms of the practice of architecture?"

As described earlier on, what happens often in Italy is a state of abandonment that Pierpaolo Pasolini in 1955 described as "Houses not yet finished and already in ruins".

The demolishers manifesto proposed below precedes and follows the considerations made thus far. Each of the ten points presented here is

rooted in the analysis just presented on urban regeneration, recycling of materials, reuse, demolition and beauty. The Manifesto stems in particular from the observation of the Italian context and from the belief that new credible options for active regeneration can be successfully introduced (dell'Aquila 2015).

The underlying assumption is that the inside and the outside of things can support each other and blossom in a world of beauty once they are expressed in a coherent way. As far-fetched as it may sound, aiming high is the only way to reach ambitious goals.

THE DEMOLISHERS MANIFESTO

1. WE DEMOLISH THE BAD, THE INCONSISTENT AND THE INHOSPITABLE. We search for sites' harmony and their simple beauty, get rid of what is suffocating.
2. WE DEMOLISH THE RELATIVISM, MAKE DECISIONS AND ACT TOGETHER We want action, tools, decisions and the emotion of sharing.
3. WE DEMOLISH HOUSES, BUILDINGS AND CITIES TO FREE, CONCENTRATE AND REBUILD. We want to work on different scales.
4. WE DEMOLISH WASTE AT ANY LEVEL AND DIMENSION. We free consumed soil and give it back to the countryside, create a social sustainable city for everyone.
5. WE DEMOLISH EGOTISM AND GREEDINESS. We want to create new shared wealth while developing new models to access wealth. Urban regeneration cannot mean gentrification.
6. WE DEMOLISH BUREAUCRACY, INACTION AND STIFFNESS. We want to organize actions, with few rules and lots of imagination. Rules cannot be an obstacle for action.
7. WE DEMOLISH IRRESPONSIBILITY. We preserve the territory, search for city and community boundaries and raise virtual walls to confine cities where life is easy and care and beauty are nurtured.
8. WE DEMOLISH INCONSISTENCY, DISORDER AND ARROGANCE. We want consistency, beauty, harmony, spontaneous kindness and poetic gestures disseminated to give emotions and soul to places.
9. WE DEMOLISH INDIVIDUALISM, CYNICISM AND RESIGNATION. We want to shake-up silent, resigned communities; we aim at proud citizens who respect their territory and the relationships they nurture.

10. WE DEMOLISH THE WALL OF SILENCE BETWEEN COMMUNITY AND TERRITORY. We pursue the beauty of resonance intertwined with community and territory.

5. Further research

A series of interviews (with experts, opinion leaders, citizens) will be carried out to deepen the perception and definition of the concept of every day beauty and of a landscape worth living. The narration of our perception, taste and experience of beauty in the landscape creates conscience and knowledge allowing a multidisciplinary interaction between landscapers, architects and citizens. With the tools of participatory democracy a common language can be forged: a shared vocabulary of beauty. Inspired by the European immigration emergency, the project proposes also to apply the Manifesto and the methodology we will develop towards targeted interventions in depopulated villages in Europe. The goal is to repopulate semi-abandoned villages by integrating migrants with local communities, engaging them in the restoration, and generating in this way new, local micro-economies.

The research seeks to develop an analytical and methodological framework to apply to the design and implementation of demolition as well as the redesign of the void. Such a framework would be developed, tested and refined by applying an inter-disciplinary approach involving relevant technical experts in the academia, urban planners and civil society. The ultimate aim is to generate awareness, knowledge and concrete tools leading to the demolition of the ugly and the redesign of the void in a spirit of beauty and public utility.

Silvana Kühtz
Assistant professor, Department of European and Mediterranean Cultures (DiCEM), University of Basilicata,
silvana.kuhtz@unibas.it

Chiara Rizzi
Assistant professor, Department of European and Mediterranean Cultures (DiCEM), University of Basilicata,
chiara.rizzi@unibas.it

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The Method for the Development of Designer's Own Ideographic Language as a Tool of Creative Communication

Galina Lola, Tatiana Aleksandrova

Abstract

In a society overloaded with fragmented and highly specialized information, design becomes a tool of creative communication: it does not merely contribute to better understanding of the actors, it is capable of developing joint innovative solutions. With its ability to create specific languages of translated messages, design makes it possible for the actors not just to exchange information but to become parts of a joint semantic ensemble of their messages and generate new ideas. The proposed Language Creation method is a tool of creative communication in interdisciplinary groups that generates specific semantic space which doesn't just overcome subjective and professionally biased approaches to the complex problems, but finds a way to avoid clichés in thinking, and secures a breakthrough to the new vision of the issue at stake.

Theme: Language
Keywords: creative communication, method, translation, ideographic language, semagram

Creative communication

Creative communication is an interaction with unpredictable result. Generally, communication is always creative unless it is tightly controlled as an implementation of a plan to achieve a predefined purpose instead of being a spontaneous process. The neopragmatist paradigm gives the proper perspective to grasp the nature of communication: it is not only an interaction between actors but also a co-creation of some meaningful and emotional reality, a co-production of an existential event (Berger & Luckmann, 1966; Galanes & Leeds-Hurwitz, 2009; Gergen, 2001). Communication produces a symbolically arranged reality by means of symbolic and cognitive structures, such as words or, to be exact, language models and constructions as well as the context of their usage. The motives of an act are created by the act itself; the circumstances are constantly constructed by the interacting individuals and thus can't be considered prearranged. This way, the results of joint acts construct the reality that becomes the context for further acts.

However, creative potential can be seriously undermined if actors are focused on predefined results and are not perceptive of the changing environment. Any attempts to construct the communication in a rigid manner

will likely lead to the reproduction of the existing algorithms of thinking and acting, which may prove ineffective in the face of future challenges. The creativity of communication relies on its contextuality and spontaneity, requiring communicative strategies to arrange (discipline) communication without limiting its freedom. Such strategies allow the actors to create the space of co-creation of ideas and to come to utterly new solutions in response to the constantly changing environment (Joas, 1996).

Design as a Tool of Creative Communication

The idea of design as a conceptual practice, that is the practice that visually implements an idea, reveals its communicative nature, which can be described in neopragmatist terms: constructing a design product does not mean merely implementing an idea, but rather its actualizing in the situation of uncertainty, which requires not just a revision of planning and rational choice, but also immediate reactions, risk-taking, and improvisation. Design harmonizes discipline with the freedom of creative thinking and suggests a set of intellectual tools to coordinate spontaneous creative communication.

Design aims to transmit a message using an image with certain semantic codes that the Other may freely interpret. The message contains an image that the Other perceives immediately in its entirety, while the reading of the codes evolves in time in a non-linear manner. Designer creates an ensemble of codes for the Other to decode by stacking and layering the meanings rather than consistently replaying them. The message constructed in this manner is a gestalt that transmits the situation in general rather than a set of meanings.

Besides, design can find form for intentions, not just ideas, thus turning them into messages. That may be the ability Marshall McLuhan referred to when he said that the artist can see and find a form for "things that, to everyone else, are not there." (McLuhan, 1964, p.64–65). McLuhan compares the threat that comes from extending oneself with new technologies with a surgery performed without anesthesia. Every new gesture produces a shift in meaning, and people look for the ways to adapt to these shifts. However, the society never quite knows what is happening to it, and consequently is unable to develop full immunity to new technologies. Only artist can help develop this kind of immunity. According to McLuhan, artist can belong to any field, be it science or humanities. She or he is distinguished for the ability to grasp the shifts in the meaning,

give them form, and face them. Artist has a solid and comprehensive understanding of what is going on, which allows her or him to make corrections to the meanings before they turn into rigid clichés. The society then has an opportunity to translate the forms created by artist into social "navigation maps."

Fully acknowledging the merit of McLuhan's idea, it is worth noting that the weak and spontaneous endeavors of artists may be supported by "strong" and organized work of designer. Design can create special constructions, in which indistinct and complex semantic entities become semantics ensembles (Lola, 2012). One can say that design fosters creative communication by offering its own language for transmitting the message. Designer must be experienced in the translation of information into the language of a meaning-producing gestalt and produce messages as dynamic entities that bear certain meaning but never take a rigid form.

Abductive thinking plays an important role in this, as it helps designer to manage images (Kolko, 2010). However, metaphorical thinking has some disadvantages: for example, images, or rather the thought forms it produces, are unstable and subjective, which may hamper communication. To turn images into clear messages, one needs a system that may be described as a language system.

The recognition of the need to put abductive thinking in order and to transform it into a medium of creative communication was a starting point for the authors of the Language Creation method and its testing in the translation of a poetic text.

The Language Creation method

A complicated poetic text was offered for translation. Poetry is a specific mode of meaning, or rather meanings that are not linked to each other but flow from one to another, constantly changing and creating new overtones. Poetic text exists and evolves as a live and thinking matter. It demonstrates the identity of form and contents and is momentary, which makes it impossible to retell in any other form. Any attempt to analyze and explain poetry results in irretrievable loss of meaning. To keep its semantic substance intact, poetry should be put into a specially constructed form. This form is not just necessary to insert a pause between understanding and statement, but also to let the meaning format itself in a natural way. The construction of such a form can be called translation, which invokes the issue of accuracy in translation.

Obviously, literal translation (retelling) would be a mistake, but unfettered interpretation is also inadmissible. Tibon's method helps achieve the balance between faithfulness to the original and personal interpretation (as described in Milorad Pavic's "Dictionary of the Khazars"):

> "After finishing a chapter, Tibon did what the ancient translators of the Bible had done: he asked someone to read the translation aloud while walking away further and further while he stayed put and listened. As the person walked further, the text began to lose pieces in the wind and behind corners, struggling through bushes and tree branches, going round doors and fences, losing names and vowels <...> so only the verbs and numerals could be heard from the distance. As the person came back, it occurred in the reverse order, and Tibon would make corrections based on his impressions of such walking reading." (Pavic, 2016)

Applying Tibon's principles ("while walking," "aloud," "verbs," "numerals") gives us a chance to make the translation concordant to the original text, and consequently accurate. The "while walking" principle refers to the progressive nature of communications; the "aloud" principle makes one consider the ambiguity and unpredictability of communication caused by interference; "verbs" emphasize the supremacy of acts while "numerals" referred to the point of assembly that hold together dynamic semantics structures. The translation of a poetic text was based on the Language Creation method that relies on a few principles.

The translation of a poetic text was broken down into eight actions:

1. Emotional immersing into the text.
2. Extracting from the text (which cannot be retold otherwise) the key codes of the first order that help replay the general meaning of the text in mind.
3. Describing in a short narrative one's own understanding of the general meaning "highlighted" by the key codes.
4. Fixing one's own understanding of the general meaning of the text in the key codes of the second order that allow for expressing this understanding in one's own language.
5. Identifying the codes of the second order: which codes refer to acts, "verbs," and which refer to points of definiteness, "numerals."

6. Developing a formal language system, describing it and implementing it graphically.
7. Using this graphic language to "translate" the key codes of the second order, which allows for creating the gestalt of the poetic text in the formalized graphic composition of semagrams.
8. Using this graphic language to "translate" another text in order to demonstrate the universality of the produced language system.

Let's analyze every step separately:

1. DRIFT: If we can't express what we immediately feel and understand we need to create a medium space and put ourselves in it for some time. In the case of poetic translation, this means being inside the poetic text without trying to understand it, let alone analyze it. In practical terms, it meant continuous reading of the poetic text.
2. TRIGGER 1: At some point, the poetic text seemed to exist in the translator's mind independently. To keep it in that state, one needs "hooks" and "beacons." We have called them the first order triggers (tg1). Essentially, those are quotations consisting of one or a few words. Like a laser beam, Trigger 1 turns a flat image into a 3D figure: one pulls the trigger, and the whole text comes back to live in mind.
3. SENSE OF MEANING: At this stage, translator was able to tell what the trigger highlighted in the text and describe the arising sense of meaning.
4. TRIGGER 2: At this stage, the sense of meaning needs to be marked with one's own words, the triggers of the second order (tg2) existing at some distance from the original source. Triggers 2 are translator's own codes that illuminate her or his personal experience rather than the text itself: uttering them brings back the feelings one had while reading the text.
5. IDENTIFYING THE TRIGGERS: It is necessary to identify triggers 2 as "verbs" (they refer to movement, fluidity, transformation) or "numerals" (they fix the point of definiteness).
6. LANGUAGE CREATION: At this stage, the poetic text existed in the translator's mind as a recollection: during the drift stage, translator immersed in the poetic text, lived in it, experienced it, and... fell asleep. Now the translator is awakening and recalling; some-

thing is lost, something is mixed up, but the main thing is there. Now the translator needs a new language to describe her or his recollection.

7. Creation of a script, a graphic form of language that contains one or more semagrams.
8. The semagram thus created is used to "translate" another text in order to prove the universality of that particular language system.

The implementation of the key stage depended on a number of clear requirements. The language needed to be:

1. semagraphical, not glottographical: no resemblance to oral speech;
2. ideographical: image conveys the idea as a whole, not sounds or words;
3. performative: actualize, not inform;
4. an open self-developing system where meaning appears not as aresult of the connection of graphic elements but due to modifications of the whole graphic figure that develops like a living organism.

Such a language is not merely a means of translation; it enables graphic coding of thoughts, letting the language speak itself, or rather show us what we are conscious of. This model follows the Heptapod B language as described in Ted Chiang's "Story of Your Life." That language enhanced foresight: as the protagonist studied the script of alien Heptapods, she became to be able to recognize the semantic ensemble as a whole:

> "Instead of carefully trying to design a sentence before writing, I could simply begin putting down strokes immediately; my initial strokes almost always turned out to be compatible with an elegant rendition of what I was trying to say. [...] There were trance-like moments during the day when my thoughts weren't expressed with my internal voice; instead, I saw semagrams with my mind's eye, sprouting like frost on a windowpane." (Ted Chiang, 2016)

The language created by designer (each with its own vison) must produce meaning: I write a semagram and recognize my thought in it. As we invented such a language, we overcame the inertial linearity of thinking and employed non-linear "fluttering" predicative mind. Only that kind of

language can be used to translate poetry. It made it possible to discuss what "this text is telling me." That's what translation is: making the strange familiar, something you can talk about.

The Language Creation method allowed the designers to activate their ability to think in a non-linear, fractal, and uncertain fashion. It developed their skills in creating the massage as a self-organizing system open to signification and resignification, and made them understand the balance between the precision and the freedom of translation. Designer's ability to create a personal graphic language for a message enables creative communication and bridges the gap between the rational and the intuitive while preserving the freedom of the creative process.

Samples of the languages created by the designers

Ardak Mukanova (*Figure 1*) used a model of dragon to create her language: it's a live form covered with a texture that can change pattern, color, brightness, contrast, saturation, and other properties of a living being. The form changes constantly: dragon can turn into grasshopper, then

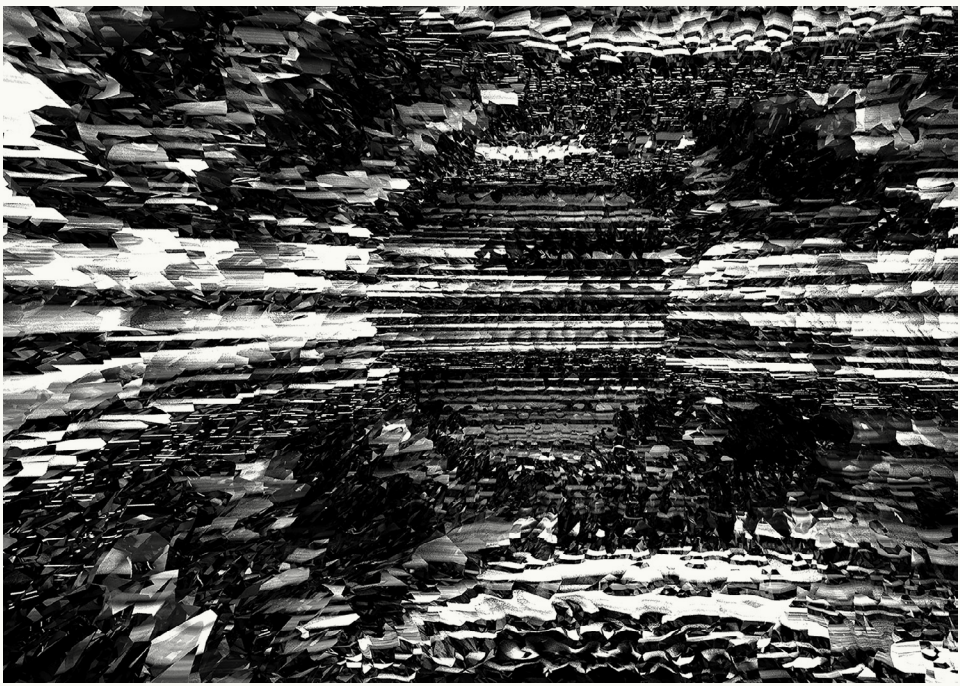


Figure 1. Ardak Mukanova

into bacteria, and so on. The language may be presented statically, dynamically, or as a 3D figure, depending on the translator's mood; besides, the language can generate itself on its own.

One can travel inside this language, creating new forms, or go beyond it and watch it from afar. It will always look different: there are no identical sides to it. Graphical semagrams show the movement paths inside the dragon and sometimes outside it. The algorithm may be developed by using a different form; it may be an animal, a human being, or a natural object – the most important thing is to see it in motion. The form may be enhanced with additional textures that can change over time; once can travel inside the given form or change it here and now. One can travel all the way inside or outsides the Form, walk around it, get lost in its complicated tunnels or internal organs and systems. This will still be a single semagram that conveys the meaning of the text.

Alena Staskova (*Figure 2*) created a 3D language that allows for simultaneous reading of semagrams. It is based on the hoop bearing "numerals" (point words) pierced with "verbs" (action words). The forms can be soft, fluid, and sharp. They were created to facilitate the transmission of

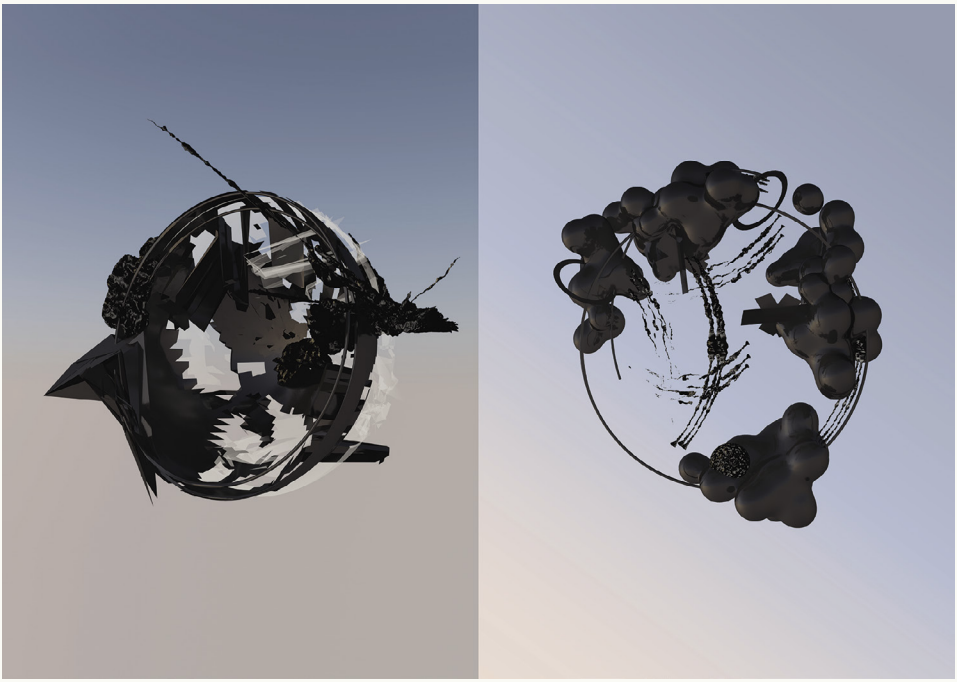


Figure 2. Alena Staskova

the message. The semagram consists of two kinds of black matter and a transparent matter: the black glossy matter renders fluidity; the black lumpy matter accumulates semantic points; the transparent matter renders the effect of a subtle oscillating state. This semagram should be read with a quick glance at the whole form followed by focusing on its points; one should move along the hoop in either direction, sometimes stopping to analyze one's impressions.

Tanya Georgiyeva (*Figure 3*) paid special attention to the process of the creation of semagrams. As the "verbs" are unsteady, unpredictable, and uninterrupted, they are drawn using different techniques and media, ranging from ink to the scraps of paper. The "numerals" are done differently, though they are connected with the "verbs" as parts of a bigger framework. The "numerals" are the small accents that draw attention and designate important points to hold the rest of the contents, keeping it from disintegrating. They sit on the grid that works as matrix. The semagrams may be light or heavy, large or small, but they will have a regular form: "numerals" shall be distinct from the "verbs." This creates a contrast between the computer-generated and the hand-made graphics.

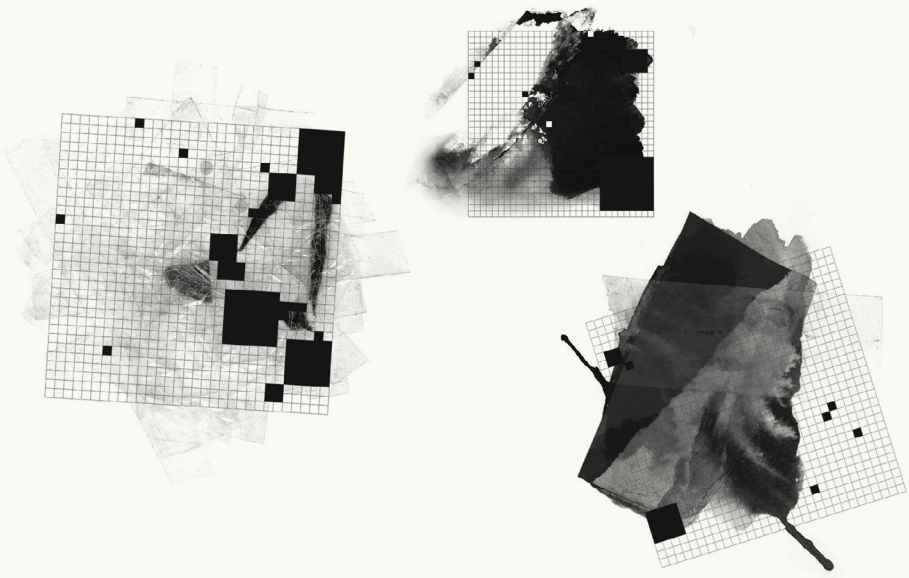


Figure 3. Tanya Georgiyeva

Aleksei Dmitriyev (*Figure 4*) created a language system where ideas arise depending on the turn of semagrams. The texture of graphic figures is “cloudy”, lumpy and light at the same time; it breaks the usual train of thoughts, placing them in the realms of associations, intuition, and guess. The rotation of “numerals” leads to new metaphors.

To evaluate this method, the designers were offered to translate a poetic text; students majoring in various fields (design, philology, physics, IT) took part in the interdisciplinary seminar at Polytechnic University. The testing of this Language Creation method by an interdisciplinary team gave interesting results: 1) designers explained the principles of creation of their own graphic language, and this alone built a unified platform for efficient communication between the experts from various fields; 2) the principles of language production outlined above were used by the members of the team to develop a common foresight-project and showed a universal heuristic potential of this method.

Usage of the Language Creation method helps designer overcome the arbitrariness of the abductive thinking and introduce stringency into the image creation process aimed to convey meaning. By securing and

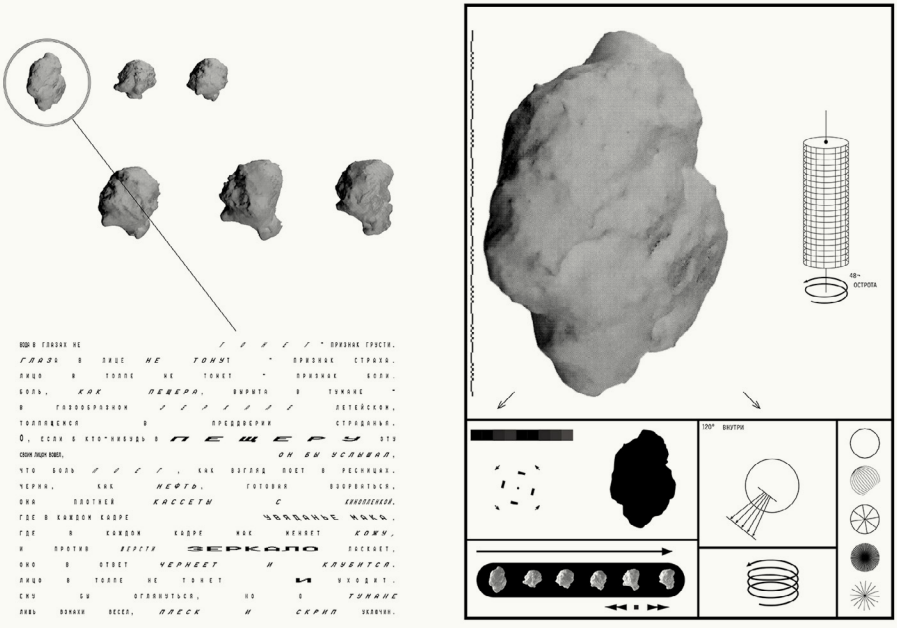


Figure 4. Aleksei Dmitriyev

even inducing creative freedom, the Language Creation method makes the designer aim for better understanding of her or his statement by the Other. But the main potential of the Language Creation method lies in itsability to be used as a universal tool of creative communication in interdisciplinary groups: a mere discussion about that sets parameters of a very specific semantic space that, on the one hand, disciplines the discourse, helping actors overcome their subjective and professionally biased approaches to complex issues, while, on the other hand, most importantly, it shows the communicating subjects the ways to overcome mental clichés and break through to the new vision of issues at stake.

Galina Lola
Professor, St.Petersburg State University,
galina_lola@mail.ru

Tatiana Aleksandrova
Assistant, St.Petersburg State University,
7810768@gmail.com

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A shared data format for describing collaborative design processes

Massimo Menichinelli

Abstract

The design research and practice have recently been investigating how to have an active role in enabling collaborative and distributed systems through the analysis, visualization and design of their collaborative tools, platforms, processes and organizations. By adopting a meta-design perspective, new possibilities have emerged for designers to be active agents in the organization and management of collaborative and distributed processes, especially design ones. This paper presents a data format for describing collaborative design processes, building on existing literature and cases and encoded in the development of an experimental digital platform for the co-design of collaborative processes. This data format is a key component of a framework for modelling, analysis, management and visualization of design processes and such a framework could potentially facilitate the design, understanding, management and participation in open, collaborative and distributed processes.

One research question is the basis of this paper: how can be collaborative design processes documented, analysed, managed, shared? This paper aims at bringing a contribution to these questions focusing specifically on a design process ontology encoded in a data format and software. The paper focuses on the context of Indie Designers and the Maker Movement, and provides a) an overview of the existing approaches to documenting design projects and processes, b) a proposal of an ontology and data format for describing collaborative design processes and d) directions for future research, especially in the validation of the proposal.

Theme: Language
Keywords: data, process, collaboration, organization, meta-design

1. Introduction

In the recent decades ICT technologies have shaped new ways of working, participating, and assessing projects, which in turn have contributed to shaping these technologies. The introduction of ICT technologies, from desktop software to digital online platforms, have had an impact on design not just for few activities like 2D or 3D modelling, but also on all the activities and actors of the design ecosystem (discussion, research, manufacturing, distribution, ...) and not just in terms of tools, but also in terms of

approaches, business models, trends, processes. For example, the boundaries between amateur and professional designers have been blurring (Atkinson, 2010; Gerritzen & Lovink, 2010; Manzini, 2015), especially regarding design and production especially with the emergence of the Maker Movement (Anderson, 2012; Gershenfeld, 2005; Hatch, 2014) but also of Indie Designers, professional designers producing their projects independently (Bianchini & Maffei, 2012, 2013); these two phenomena represents the context explored in this paper. Online platforms and practices have generated initiatives with new modalities of interaction and management of intellectual properties in design processes that mix Design with Crowdsourcing dynamics (Howard, Achiche, Özkil, & McAloone, 2012; Howe, 2006; Nickerson, Sakamoto, & Yu, 2011) or with Open Source and P2P dynamics (Abel, Evers, Klaassen, & Troxler, 2011; Bauwens, 2009; Ciuccarelli, 2008; Cruickshank, 2014; Menichinelli, 2016). Thanks to the introduction of software and programming languages like Processing (Reas & Fry, 2014), designers and architects are increasingly shifting their focus from designing artifacts with the help of a software, to writing a software that directly generates artifacts, often with genetic and evolutionary algorithms (Shiffman, Fry, & Marsh, 2012), with a Generative Design approach (Bohnacker, Gross, & Laub, 2012; Reas & McWilliams, 2010).

Consequently, the Design discipline has changed in several ways, for example by increasingly moving its scope from single users to local and online communities, from isolated projects to complex system of solutions, while investigating tools and strategies that enable and understand both complex artifacts and mass-scale interactions. Not only practitioners, but also researchers have started investigating these directions, for example a) with a focus on localities and their traditions, production systems and communities (Maffei & Villari, 2006; Verwijnen & Karkku, 2004; Villari, 2013), or b) with a focus on social innovations, especially developed by citizens and informal designers (Manzini, 2015; Meroni, 2007), or c) with a focus on how ICT technologies enable new modelling techniques (Menges & Ahlquist, 2011; Poole & Shvartzberg, 2015; Singh & Gu, 2012) or d) enable the organization of collaborative initiatives (Menichinelli, 2016). Broadly speaking, one of the common elements among these trends and phenomena is the new understanding of designers as facilitators and organizers of socio-technical systems made of creative and productive agents. Designers are seen as having more focus on creating the contexts for complex and multi-agent and multi-stakeholder design processes, rather than directly designing artifacts themselves, and this

perspective falls into the domain of the Meta-Design perspective.

More specifically, this paper focuses on how, being transformed in all its activities, the Design discipline has also been investigating how to have an active role in shaping these transformations by focusing on enabling collaborative and distributed systems through the analysis, visualization and design of their collaborative tools, platforms, processes and organizations. By adopting a Meta-Design perspective, new possibilities have emerged for designers to be active agents in the organization and management of collaborative and distributed processes, especially design ones. This perspective works in several directions regarding collaborative processes and organizations, and this paper focuses specifically on its data dimension and on its related software dimension. This paper explores how the description of a process could be encoded into data and thus documented, shared and executed. The focus is not or not only on applying data science to design processes, but rather to understand the datafication and digitalization of the design practice and how to improve them by empowering designers in managing them. By adopting a Meta-Design perspective, after 2D and 3D modelling, designers will increasingly focus also on modelling processes and organizations through data science and software development.

This paper presents a shared data format for describing collaborative design processes, building on existing literature and cases and the development of an experimental digital platform for the co-design of collaborative processes. This data format is a key component of a framework for modelling, analysis, management and visualization of design processes and based on four interconnected dimensions: conceptual, data, design, software. Such a framework could potentially facilitate the design, understanding, management and participation in open, collaborative and distributed processes. Furthermore, this investigation might advance our understanding our knowledge of the relations among data and design, as a possible new language and tool for working with processes and organizations. One main research question (RQ1) is the basis of this paper, to which two subsidiary research questions might be added in order to proceed with a more complete approach:

1. RQ1: How can be collaborative design processes documented, analyzed, managed, shared?
2. RQ2: How collaborative design processes have been documented and defined with a common language so far?

3. RQ3: How could we improve the documentation of collaborative design processes with a shared data format as a common language?

In order to support RQ1, RQ2 focuses on the theoretical background and the existing approaches, RQ3 focuses more on the development of a potential meta-design platform and on the strategies for its validation. This approach is developed in the paper with this structure:

1. Introduction: this section introduces the context, the overall scope of the paper, its research questions and structure.
2. Describing (design) processes: this section proposes a) an overview of the possibilities regarding the documentation of design processes for the Indie Designers and Maker Movement context with the use of data formats as shared languages. This section addresses RQ2.
3. A shared data format for describing collaborative design processes: this section elaborates a proposal of a data format and a related meta-design digital platform that documents collaborative design processes. This proposal is the result of a the previous section and of a process of software prototyping. This section addresses RQ3.
4. Validation and future research: this section proposes validation strategies for the data format and related digital platform presented in the previous section and proposes further research questions to be addressed in future research. This section addresses RQ3.
5. Conclusions: this section resumes how each of the previous sections has replied to the three research questions (RQ1-RQ2-RQ3) proposed in the first section.

2. Describing (design) processes

How collaborative design processes have been documented and defined with a common language so far (RQ2)? This section provides an overview of the possibilities, especially with a focus on the context of makers and independent designers. Within design research, design processes have been examined considering design as the work done by designers, studying thus the actual practice. For example, Cross (2006) elaborated that there is a distinct 'designerly' form of activity and ways of knowing different from the scientific tradition, and he identified three sources of design

knowledge for studying this: people, processes and product. According to him designers learn and adopt a language that connects and translate between different domains (needs and design, meaning and design, and so on) by means of a system of codes, and these embodies the 'designerly ways of knowing'. However, he points out that typically the knowledge and awareness that designers have of their practice is basically tacit, making it thus difficult to elaborate, document and share with the consequence that design education is generally based on an apprenticeship system of learning. In their analysis of existing literature about design processes and a proposal of a design process ontology, Green, Southee and Boult (2014) point out that research on design processes has a relatively short history, where models are highly edited and rationalized abstractions of reality but disconnected from the actual practice and with limited consensus on their structure. Even within the design practice, the recently popular phenomenon of design thinking consultancies is highly criticized also for the simplistic perspective, the extreme generalization and poor consideration of design processes (Vinsel, 2017).

The previous section highlighted the importance of the Meta-Design perspective, that considers designers as having more focus on creating the contexts for complex and multi-agent and multi-stakeholder design processes, rather than directly designing artifacts themselves. For example, Ehn (Ehn, 2008) considers it as a way to leave space for user participation in the design process even after the design concludes, suggesting the concept of 'design-after-design'. Also Fischer has valued such approach for its capacity to extend designed systems beyond their original nature, and because it includes the ongoing process in which stakeholders become co-designers, but taking place not only at the time of design implementation, but throughout the whole existence of the system (Gerard Fischer, 2003; Gerhard Fischer & Scharff, 2000). According to Fischer, Meta-design characterises objectives, techniques, and processes for creating new media and environments that allow the owners of problems to act as designers. Furthermore, he considers Meta-Design being as more elaborate than User-Centered Design and Participatory Design because it shifts the control of the design process from designers to the hands of the users, embedding the action of 'designing the design process'. Giaccardi considers Meta-Design more as an emerging design culture than an established design approach, and after crossing etymological facts with extensive literature review (Giaccardi, 2003), she identified three different declinations of Meta-Design, with meta considered as:

- 'behind' (or 'designing design'): "Design of Design processes" / "Design of the generative principle of forms" / "Design of the Design tools";
- 'with' (or 'designing together'): "Design of media and environments that allow users to act as designers" / "Design of the organization of flows";
- 'between/among' (or 'designing the "in-between"'): "Designing the spaces of participation" / "Design of relational settings and affective bodies".

Rather than studying existing processes, the Meta-Design approach focuses often on designing environments and tools for facilitating the emergence of design processes, and therefore is a promising approach for improving professional, independent and amateur designers in their practice. For this reason, this section proposes a brief overview of the practice of analyzing, documenting, sharing and designing processes in the Indie Design and Maker Movement. The practice of Makers has been analysed and shared by both researchers (Toombs, Bardzell, & Bardzell, 2014), practitioners (Lang, 2013) and researchers-practitioners (Gershenfeld, 2005); in the case of this article, the author has worked both as a researcher and as practitioner, reflecting thus here on the practice of documenting design processes in all their possibilities as experienced during the previous years. Documenting and sharing projects with an Open Source approach is a common practice in the Maker Movement (Menichinelli, Bianchini, Carosi, & Maffei, 2017; Troxler, 2011), and for this reason the issue of documenting how to design and produce a project among different individuals, groups and locations is a relevant one for this context, and several options are possible. For example, design processes can be documented as step by step instructions (Instructables[1], Fablabs.io[2]), or files ready for manufacturing are documented (Thingiverse[3]), or can even be automatized through custom software that control the API of cloud manufacturing services (Shapeways API[4]) or can be analyzed and rebuilt from files and users' activity on online platforms like GitHub and Google Drive (Menichinelli, 2017; Velis & Robles, 2017).

1 http://www.instructables.com/
2 https://www.fablabs.io/projects
3 https://www.thingiverse.com/
4 http://developers.shapeways.com/

These are less common approaches, with a focus on processes and the immaterial aspects of projects, more common approaches are still the ones that document artifacts, be them existing or to be produced (Table 1). In the Indie Design and Maker Movement, the task of documenting design processes can take place in different ways of design documentation (DD), depending on how design is considered:

1. DD1: design as a process ("i.e. step by step instructions");
2. DD2: design as an organization ("i.e. networks of interactions, work organization");
3. DD3: design as a documentation ("i.e. blueprints");
4. DD4: design as production ("i.e. files ready for direct fabrication");
5. DD5: design as an artifact ("the artifact and its description").

Perspectives	Dimension	Focus	Examples	Data	Process as
DD1: Design as an organization	Meta-Design	Process	Rebuilt from files and users' activity on online platforms	API, databases	Dialogue
DD2: Design as a process	Meta-Design	Process	Instructables Fablabs.io...	API, databases	Execution of activities
DD3: Design as a documentation	Design	Artefact	Blueprints Sketches...	2D/3D data representing an artifact not yet produced	Execution of the documentation
DD4: Design as a production	Design	Process	Thingiverse Shapeways API GitHub...	API, databases	Execution of activities
DD5: Design as an artifact	Design	Artefact	Pictures Videos 3D scan...	2D/3D data representing an existing artifact	Outcome of an execution of activities and dialogues

Table 1. Design Documentation typologies

A common element of these main approaches for documenting design projects and processes is the pervasive presence of the digital and data dimension, and how these two dimensions have been applied to several aspects of the practice. DD1 and DD2 can be categorized as Meta-Design

since they both represent and enables the development of individual and collective work in design processes, while DD3, DD4 and DD5 as Design since they represent a design project and its output or transformation into the final output (Figure 1). While only DD2 focuses on processes as generally considered (i.e. a sequence of steps depicting how to replicate a process), all of these perspectives are important for the Maker practice and therefore for applying a Meta-Design approach to it because:

- they represent all aspects of design processes in the practice, and therefore can be integrated in order to further understand them with a more complex perspective;
- they represent building blocks for Meta-Design tools and environments, and could be recombined and integrated in order to further support collaborative design processes with a more complex offer.

As a consequence of this, a Design Documentation Score (DDS) could be calculated for Meta-Design environments based on this framework, ranging from 0 to 5 depending on the number of Design Documentation perspectives a meta-design platform includes. Rather than providing a judgement about a platform, this score could provide an indication of the complexity of approach and possibilities that a platform adopts and provides to its users. Furthermore, it should be note how these five perspectives could be broadly clustered into three main approaches for documenting design processes, whether they are explicitly designed and documented or analysed and rebuilt from the practice:

1. ADD1: processes are considered as the execution of activities;
2. ADD2: processes are considered as a dialogue between actors;
3. ADD3: processes are reconstructed from the reverse engineering of artifacts and documents.

Encoding and visualization are common actions for these three approaches, representing the translation between machine-readable data to human-readable representations, for both existing processes and projects and for future ones (Figure 2). These three approaches can also be found in the research and practice of designing and analysing processes outside the Design discipline. For example, the ADD1 approach is similar to most of the approaches from engineering and management domain that mainly consider processes as business processes: “a collection of tasks

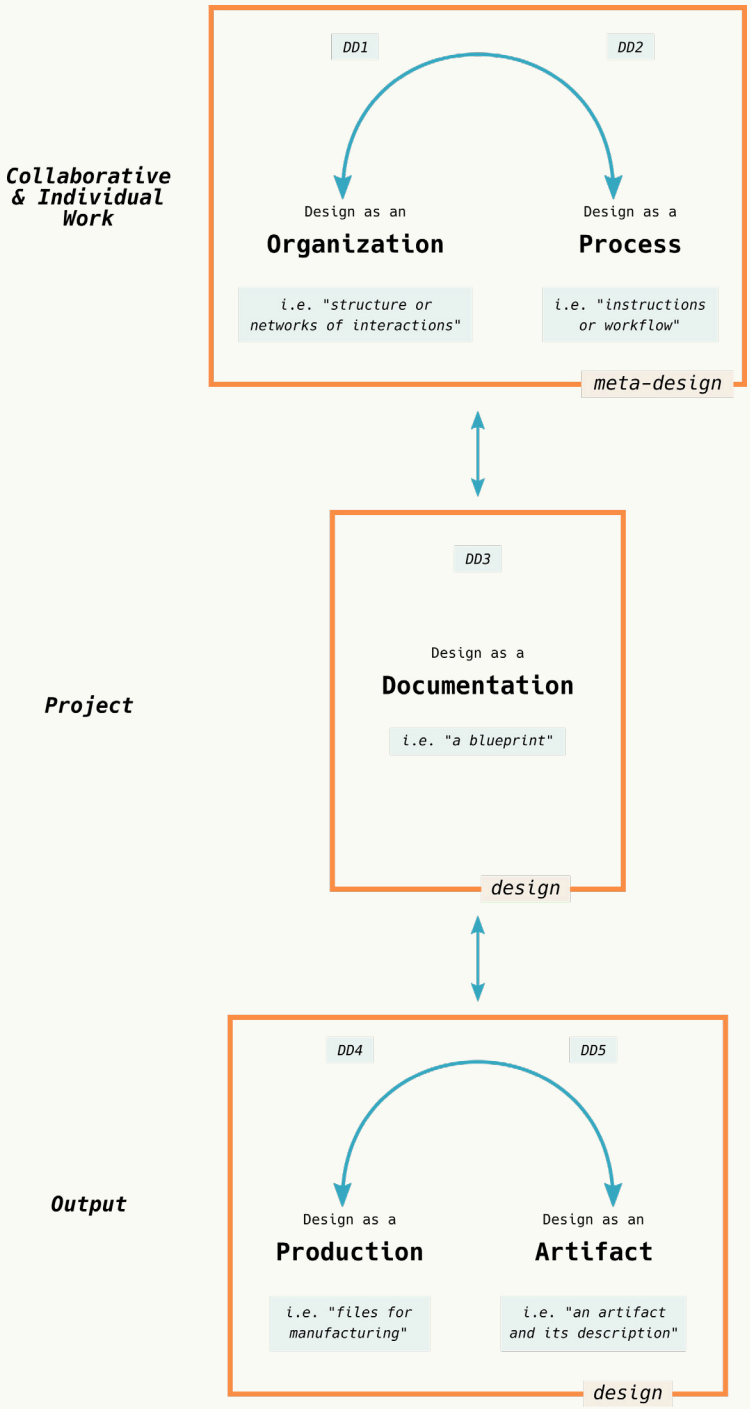


Figure 1. Design Documentation typologies.

and activities (business operations and actions) consisting of employees, materials, machines, systems, and methods that are being structured in such way as to design, create, and deliver a product or a service to the consumer" (Scheel, Rosing, Fonseca, & Foldager, 2015, p. 1). Examples of this are the Business Process Model and Notation (BPMN), a standard for graphical notation that extends flowchart techniques through models that can be executed through a machine-readable XML data format (Scheel et al., 2015), and Process Mining, the analysis of existing processes from the log of their activities (van der Aalst, 2011). In design research, this direction has already been adopted by few researchers that reconstruct processes from files, logs and databases of design projects (Menichinelli, 2017; Velis & Robles, 2017).

The ADD2 approach is similar to several initiatives that work on the analysis, visualization and design of narrative texts. For example, researchers have been able to identify the most common processes of storytelling by analysing the emotional trajectory of novels (Reagan, Mitchell, Kiley, Danforth, & Dodds, 2016), or in some cases software facilitates the writing of scripts while also visualizing its dynamics, characters, emotion-

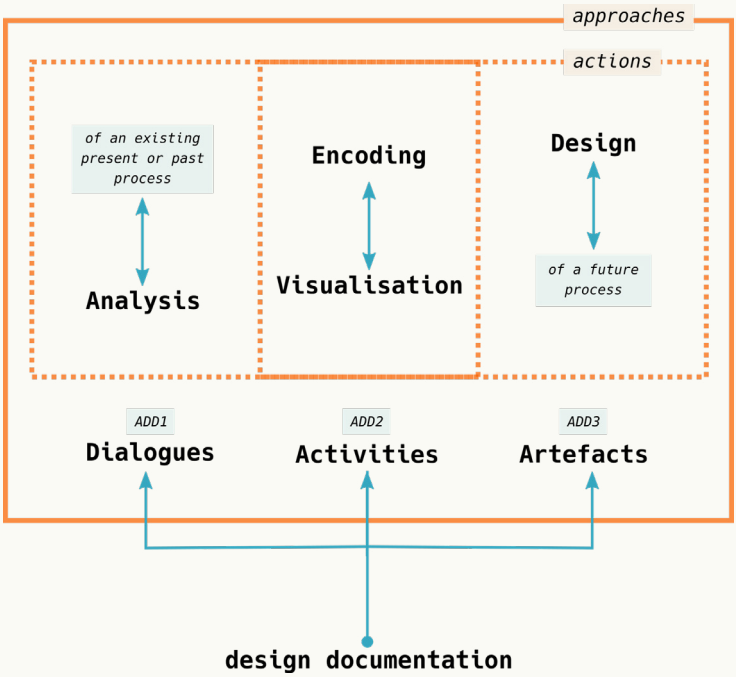


Figure 2. Design Documentation approaches and their actions.

al arcs (Story Touch, n.d.) or translates scripts into comic strips (KesieV, 2011) (see Figures 3, and 5 for an example application). Scripts (i.e. just the dialogues of a plot) have been particularly popular in analyses that are able to uncover their hidden social dynamics: an interesting example can be found in the Star Wars movies, which have been analysed and visualized in several different ways and methods, proving how the same data source (the script) could be a rich document for understanding processes with different perspectives. One of the first examples of visualizing the storyline of Star Wars can be found in a hand-drawn chart on the XCKD website (Munroe, 2009); the popularity of this visualization has lead data scientists and designers to develop software for automatizing the analysis and visualization of such scripts as processes (Franklin, Elvery, & Spraggon, 2015), but also for understanding their social networks (Gabasova, 2015, 2016) and activities and performance (Diamond, Glassman, Illick, & Whiteaker, 2015). The Star Wars storyline was also elaborated in hand-drawn illustration in the Cinemaps book by DeGraff (DeGraff & Jameson, 2017), where the process is depicted together with the locations where it takes place. In design research, this direction has already been adopted by several researchers that reconstruct processes from verbal data through protocol analysis in order to study cognitive processes, with both quantitative and qualitative approaches (Goldschmidt, 2014; Kan, 2017).

The ADD3 approach may be the more informal, less structured and researched but more adopted by makers, consisting in reconstructing how to design and make an artifact from the artifact itself. This task could be simplified by digitalization technologies like 3D scanning, but while these techniques can convey a documentation that can be manufactured, the identification of more complex processes is a harder task.

3. A shared data format for describing collaborative design processes

The previous section provided an overview of existing practices in the Maker Movement regarding the documentation of design projects and processes, and this section proposes a data format as a common language for improving these practices while learning from them (RQ3). The main starting point for the development of the data format is to consider its ontology, "a set of concepts and categories in a subject area or domain that shows their properties and the relations between them" (Oxford Dictionaries, 2018), a terminological framework that describes thus design pro-

cesses. The research done by Green, Southee and Boult has shown how an ontology of design processes is still an open issue, an iterative process with many possible solutions (Green et al., 2014) but a very important one, especially for design protocol analysis (Kan, 2017). They consider design processes as the foundational framework for exploring where value is added through design, adopting an input-process-output (IPO) model: in this way, analyzing the output could provide a measurement of the impact of the process, and comparing output and input could provide a measurement of the efficiency of the process and of the value obtained from it. This section proposes to focus on the approach of processes as a set of activities (ADD1) as the main perspective for the ontology encoded in the data format, while also adding (but elaborating to a less extent) also the possibility of considering processes as a dialogue (ADD2). As a consequence, this article propose to adopt Activity Theory as the conceptual basis for the ontology of the data format, since it is a framework for orienting researchers in understanding complex socio-technical phenomena and, especially in the version elaborated by Engeström (1987), it provides a way for understanding the dialectic contradictions and continuous development of individual contributions to collaborative initiatives taking into consideration all the elements that mediate all the activities and their contexts. Activity Theory has an established tradition of being adopted in the Design discipline, for example by Human Computer Interaction research and practice since the 1980s' in several directions (Kaptelinin & Nardi, 2012, 2009), for example in order to improve the theoretical background of Human Computer Interaction or as a potential strategy that evolves from Human-Centered Design (Norman, 2005). Furthermore, Activity Theory has already been directly applied to collaborative design processes by researchers that analysed the design practice in collaborative settings in order to understand teams' interactions and relative collaborative evolution and its dynamics (Zahedi, Tessier, & Hawey, 2017) and also in the design of communities (Barab, Schatz, & Scheckler, 2004). Activity Theory thus provides the concepts for framing, understanding and designing processes, and together with the Meta-Design approach (Gerhard Fischer & Scharff, 2000) its adoption would be a promising strategy along three main scenarios:

1. S1: for providing a well established ontology of activities, which can be integrated with other elements (Figure 3);
2. S2: for the generation of guidelines for the development of the digital platforms that enable the former point; the importance of a

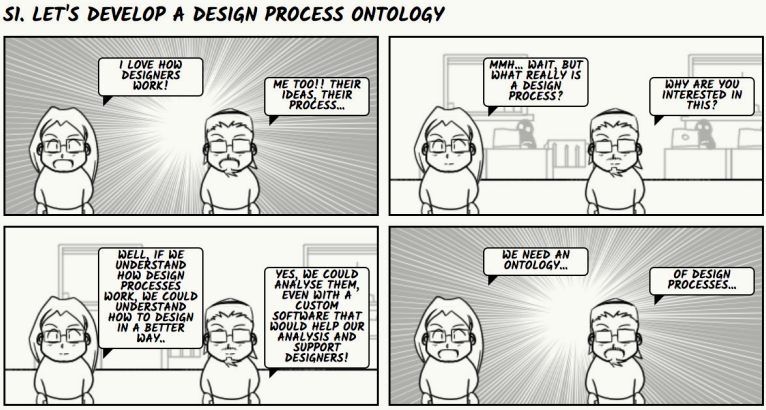


Figure 3. Storyboard example for S1, generated with the ScriptThis! software.

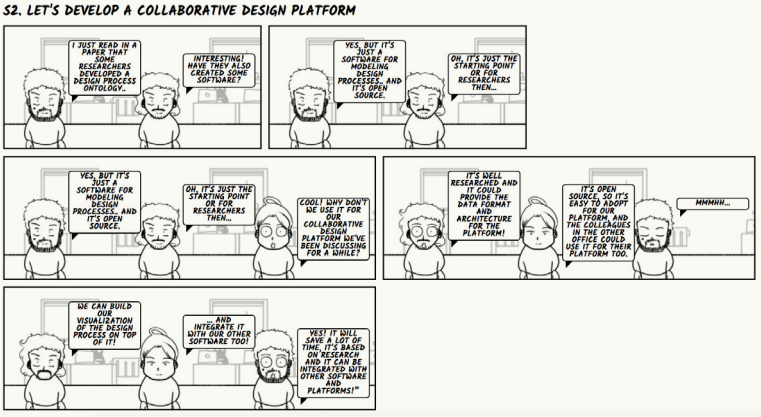


Figure 4. Storyboard example for S2, generated with the ScriptThis! software.

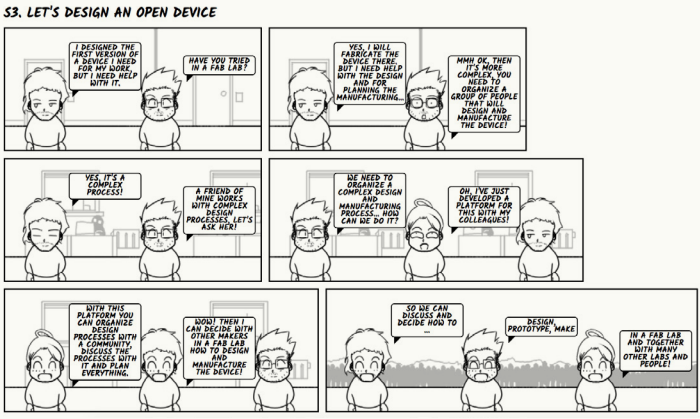


Figure 5. Storyboard example for S1, generated with the ScriptThis! software.

platform here lays in its abilities to enable the participation of more users (Figure 4);

3. S3: for enabling both professional designers and untrained users to work together in collaborative design processes thanks to the conscious and reflexive design of the activities constituting such collaborative design processes (Figure 5).

These three scenarios can be visualized with three simple storyboards of figures 3, 4 and 5, generated with generated with the ScriptThis! Software (KesieV, 2011) that visualizes scripts as comics[5].

The data format would then encode the ontology describing the activities of design processes, and if dialogues between the participants of such processes are included in the data format, also further approaches like protocol analysis (Goldschmidt, 2014; Kan, 2017) or natural language processing (Crowston, Allen, & Heckman, 2012) could be then applied to the same data. It is important to consider here that while the data format could be already considered alone as a shared language (provided that its description and guidelines of usage are shared openly), it is of little use if not for developers or researchers, and should be then embedded into a software that would enable anybody to edit and visualize the data in an intuitive way, and in a collaborative way since the purpose of documenting and sharing collaborative design processes is to improve their dimension of collaboration. Such software could take several shapes and this article suggests to focus on developing a platform for it, thanks to its ability to connect multiple users. Such a platform would then be based on three dimensions:

A. Data (the data format);
B. Design (the intuitive visualization of the data format);
C. Software (the agent that binds the data format, the visualization and the interactions users have with it and among them).

The platform is then built on a conceptual framework that includes Activity Theory (Figure 6).

The data format here proposed has been developed through a software-based prototyping of the platform, i.e. the data format has been

5 The scripts can be found at: https://gist.github.com/openp2pdesign/2507e63079da27100f22e673903ab731

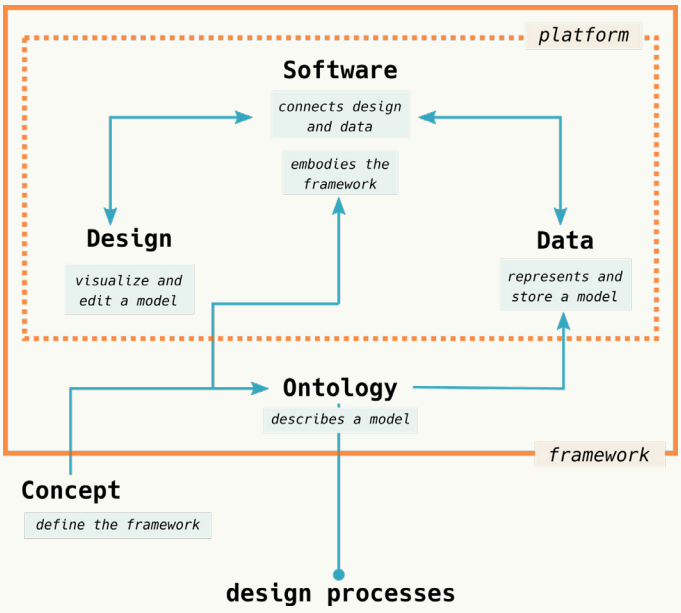


Figure 6. The framework of the Meta-Design approach presented.

developed in parallel with the software and the visualization, and it is already at the second iteration after a first version was briefly discussed in a conference paper (Menichinelli & Valsecchi, 2016). The importance of this approach lays in providing a context for reflection for the researcher (as reflective practitioner), for thinking about the ontology with a research-through-design approach instead of drafting the ontology from theoretical contributions without a connection to the practice. The data format and its ontology are in fact encoded in the software that handles the visualization and the users interactions, and the practice of development and research has contributed to inform it[6]. The main entities of the ontology in the current version of the software code that encode the data format are:

- *Location*: a geographical location that describes *where* activities and processes take place.
- *Time Interval*: a time dimension describing *when* activities and processes take place, with a beginning and an end.

6 https://github.com/openp2pdesign/openmetadesign

- *Activity Element*: the individual element part of an Activity System that describes an *activity*, according to Activity Theory (subject, object, outcome, tools, community, rules, division of labour).
- *Activity*: an Activity System describing an *activity.*
- *Contradiction*: a conflict between *elements of activities* and *activities*, according to Activity Theory; a contradiction enables the *discussion* and understanding of critical elements of *activities* that will evolve in the future.
- *Flow*: a flow of information, physical resources or financial resources between *activities*.
- *Process*: a collection of *activities* of one *project*.
- *Discussion*: a *dialogue* between the users of the platform that can discuss the specific element (a *discussion* is connected to several element of the data format, see figures 7 and 8).
- *Separator*: an element separating *processes*, with the ability to then add meaning to their separations and order.
- *Version*: an element tracking the history of the project by storing all its changes done by users of the platform.
- *User*: a list of the users that discussed the *project*.
- *License*: a Creative Commons license that legally describes how the *project* can be shared.
- *Project*: the main *project* all the *users* collaboratively discuss in the platform, and that embeds all the previous elements.

As in the cases of text analyses and visualization of the previous section, the architecture and ontology software code can be automatically visualized and reconstructed, especially with UML diagrams (at the same time, software code can be automatically generated from UML diagram). The ontology of the data format here presented is visualized in figure 7 with an UML diagram and in figure 8 with a graph diagram: the UML diagram shows the classes of the data (structured following an object-oriented approach at programming) and their connections, the graph diagram represents a network perspective of them. The UML diagram presented in figure 7 was automatically generated from the software code describing the data format[7] with the help of the pyreverse[8] software, and it later provided the data for the network visualization. This step then provides

7 https://gist.github.com/openp2pdesign/bd64fe6771569e36ab97e5631f00beff
8 http://manpages.ubuntu.com/manpages/trusty/man1/pyreverse.1.html

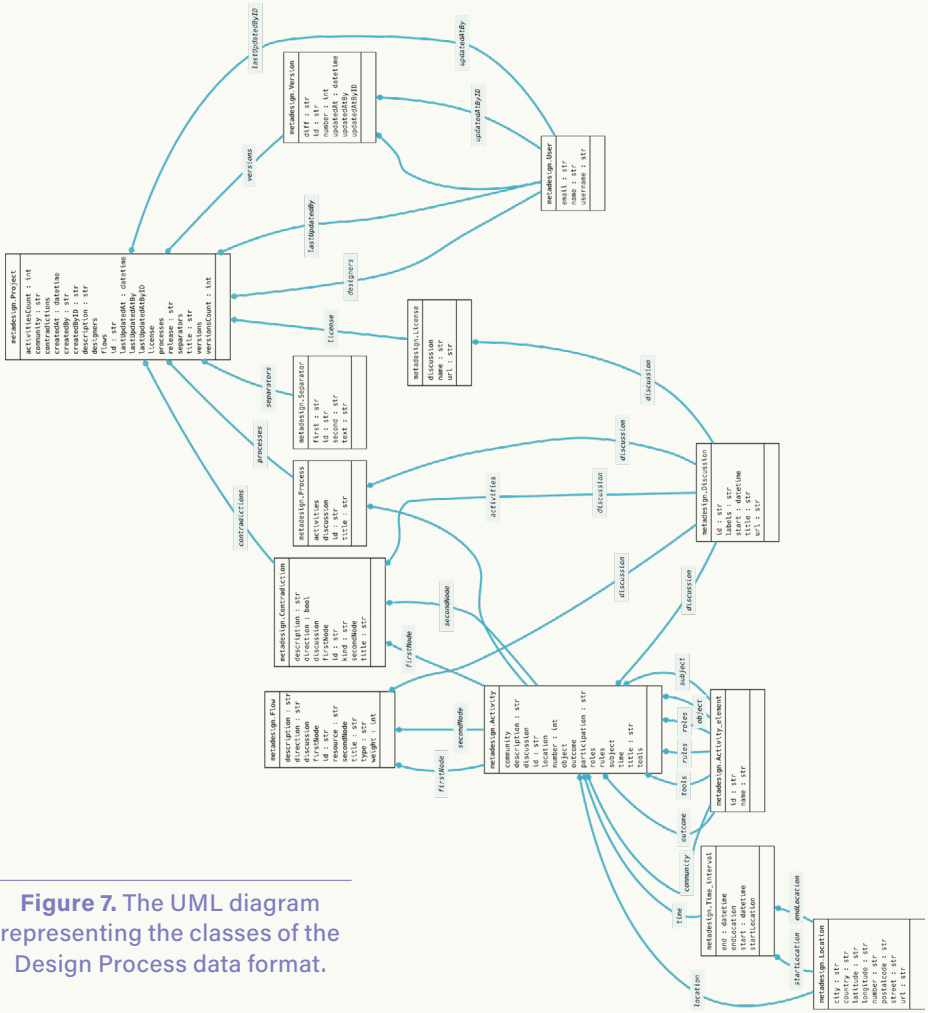


Figure 7. The UML diagram representing the classes of the Design Process data format.

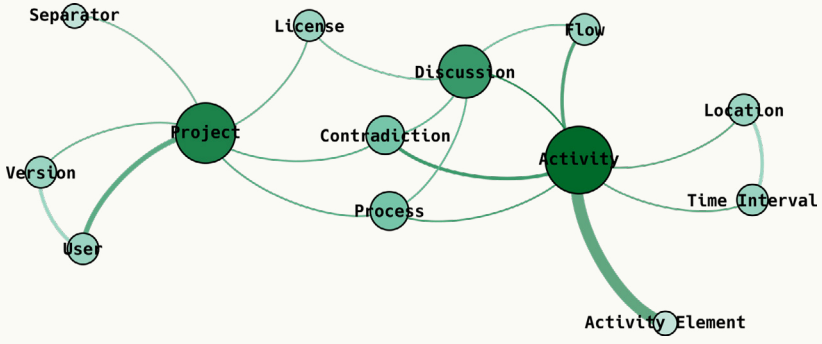


Figure 8. The network of references between the classes of the data format presented.

the ability to see how the individual elements are organized through their connections: the UML diagram shows the hierarchy of the data format (with Project as the higher level, and Location as the lower level) and extensive details about their connections. The graph shows the importance of each element (a bigger size and darker colour of a node corresponds to more connections it has in the network, i.e. degree). We can then see that Activity and then Project are the main nodes in the network, with Discussion, Contradiction and Process as the nodes connecting them. Location (space) and Time Interval (time) and Activity Element (the various building blocks of an Activity) are the main starting point for any Activity, the necessary conditions for an Activity to take place. The importance of Discussion can be found in the fact that several items (including the License regulating the sharing of the Project) can be discussed by participants. Such a structure is the result of interactions between theoretical frameworks, technical requirements and design choices, and the reflection upon the code and the data format enables the understanding of implicit assumptions.

4. Validation and future research

The meta-design data format presented in the previous section is based on a series of workshops (Menichinelli, 2015) and following reflections (Menichinelli & Valsecchi, 2016), but more steps for validation and future research are essential in order to make sure that such a complex topic, framework and visualization are valuable for users. This section elaborates further strategies and directions for evaluating the integration of Activity Theory concepts into the data format and meta-design platform. As a first step, we can elaborate the research objectives of the validation process:

1. VRO1: validate whether the meta-design framework, platform and visualization are easy to understand and to use, and it has a positive impact on collaborative design processes. This objective is related to the Software and Design dimension, and could be addressed with an Action Research approach and User Experience methods.
2. VRO2: validate whether the ontology and data format is easy to understand and to use, and it has a positive impact on collaborative design processes. This objective is related to the Software and

Data dimension, and could be addressed with an Action Research approach and User Experience methods.

The meta-design platform, as explained in figure 6, is based on three main dimensions in it: Software, Design and Data. Therefore, the validation of the platform, of its concepts, functions and data format should address all three directions with the specific stakeholders and users of each dimension. This article focus only on the Data dimension, and its validation objectives could be then formulated with the following topics and research questions:

1. VRQ1. The shared understanding of collaborative design processes: how does the data format influence the understanding of collaborative design processes?
2. VRQ2. The experience and practice of the users: how has the data format modified the user experience of collaborative processes?

Based on these perspectives, this paper suggests to adopt a triangulation of three different methods for analyzing the platform and its impact on the courses/workshops in order to understand more the dimensions of the results (Gray & Malins, 2004):

1. VM1. A qualitative analysis: the data format could be discussed with design researchers and practitioners, in order to understand how its representation of design processes is perceived. This method would answer to VRQ1.
2. VM2: a qualitative analysis: the data format could be discussed with software developers and data scientists, in order to understand how it could support the integration with other platforms and tools, and how the data it provides could be analyzed by researchers. This method would answer to VRQ2.
3. VM3: a qualitative analysis: the data format could be discussed with design researchers, practitioners and developers in order to understand how the development of such an open system, and the integration with other software and platforms, could provide a shared understanding of design processes. This method would answer to VRQ2 and provide support to the research for VRQ1.

5. Conclusions

The paper explores how design projects and processes are documented in the context of Indie Designers and the Maker Movement, and it provides a proposal of a data format for describing collaborative design approaches with an ontology partially based on Activity Theory, and directions for future research, especially in the validation of the proposal. The data format is considered within the ecosystem of software and design elements that enables it to be encoded, visualized and used by users in the conscious and reflexive design of the activities constituting such collaborative design processes. How can be collaborative design processes documented and how could we improve the documentation of collaborative design processes with a shared data format as a common language? The paper tries to answer to this question by providing a) an overview of the approaches to documenting design projects and processes, b) elaborating a proposal of an ontology and data format for describing collaborative design processes and d) suggesting directions for future research, especially in the validation of the proposal. Further research might be important for understanding how processes, and especially design ones, are perceived by both trained and untrained designers and which are the most promising metaphors, formats and strategies for visualizing them.

Massimo Menichinelli
Doctoral candidate, Aalto University –
School of Arts, Design and Architecture –
Department of Media – Media Lab Helsinki,
massimo.menichinelli@aalto.fi

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Mapping Hybrid Physical/ Digital Ambient Experiences

Towards a Shared Language for The Design of Complex Systems

Milica Pavlovic, Margherita Pillan

Abstract

The diffusion of digital technologies imposes an upgrade of design knowledge and skills, and, between others, of drawing capabilities. The design of digital facilities for functional spaces, (as, for example, in the project of digital applications and self-service touch points for retail big stores, hospitals, university campuses, libraries, etc.), requires the integration of multiple design competences: service, communication, interaction, product and interior design. Furthermore, the design of technology-based solutions, requires the collaboration between experts of different disciplines, such as engineers and business managers, and their involvement in co-design processes. In order to manage the complexity of these physical/digital solutions, and to ensure a design result oriented towards the optimal satisfaction of users, authors such as Dalton et al. (2016) and Kalbach (2016), have proposed new design approaches and mapping techniques focused on experience and on user activities.

In a project focused on user experience, drawing activities are not only aimed at defining the physical characteristics of products and spaces, but also at representing users' physical and cognitive activities in time, and the interactive processes through the system of touch-points. The new forms of drawing integrate the traditional representations so to manage complexity due to the integrated design of service and physical environments; besides, they support the management of the multidisciplinary contributions of different stakeholders, so allowing the creation of a common view. Furthermore, the interlacing of fields and cross-discipline perspective can lead to redundancy in the terms of data provided and of functionalities posed to the user, which brings experience design to a quite challenging quest to deal with.

Designing for such systems poses, as relevant aim, the comprehension of the experience that the user will have in the functional environment. This comprehension has to be mapped and represented in a way that it communicates clear messages to all the stakeholders and parties involved in the design project, thus establishing a shared language among them, while orienting the project efforts toward a common goal.

Within the paper, we shape our discussion about the design of functional spaces, as an issue of designing constraints and enablers, since the design for experience is actually seen through designing

points for limiting/enabling of activities. By mapping experience, we map the points of interaction and actions viewing environments from the side of the user that in interacting with it within a certain time period. These points are the indicators of the elements that are limiting/supporting user's activities, and therefore pose a structure for experiences.

In the paper, we deal with mapping aimed at the creation of a shared language for the design of physical/digital environments; the discussion is supported by case studies suitable for a conversation of drawing principles in design for experience. We discuss these as a base for the establishment of an emergent design language.

Theme: Language
Keywords: mapping complexity, ambient UX, hybrid physical/digital systems, shared language

1. Introduction

The design of hybrid physical-digital experiences poses the issue of managing complexity on diverse levels. This complexity is mirrored with the issue of design ecosystems that arise when adding digital solutions to physical environments and contexts.

Ecosystems here refer to two main points of view: 1) the multi-stakeholder environment that brings multidisciplinary contribution to the project, thus bringing diverse interests and values within the same (Tsujimoto et al., 2017); 2) the perception and meaningfulness, shaped from the side of the user, towards a posed connected system of digitized services (Levin, 2014; Rowland, 2015). The interlacing of fields and cross-discipline perspectives can lead to redundancy (or even contradictions or incongruences), in the terms of data provided and of functionalities posed to the user. Therefore, establishing a shared view upon the user experience (UX) in a holistic manner is of high importance to the successful design solution.

Defining and establishing a common language to be used for the field of UX within complex hybrid systems is the objective of our research. This paper specifically focuses on the tools to be used for communicating a design project of such nature. In particular, we are referring to representation capabilities and mapping techniques focused on experience and on user activities. The concept of mapping helps us in understanding

complex systems of interaction, particularly when we're dealing with abstract concepts like experience.

Working as educators and designers, we recognize the importance of developing new representation tools apt to support the design of the integrated design of physical/digital systems and of systemic sets of solutions, as an evolution of drawing techniques traditionally employed in the main disciplines converging in the management of complex systems. We underline the importance of establishing a common language in communicating design projects, not only for the design practice, but also for the educational purposes. In fact, through the teaching of maps and diagrams focused on user experience, we train the students to understand and frame complexity of the new systems, and we give them the means to envision and manage the new design challenges.

In the paper we report our approach in design and education experiences. We present here the main conceptual tools we employed for the teaching course of UX design in the Master Degree Program of Digital and Interaction Design at the Design School of Politecnico di Milano; we extract the contents for education from literature and form our practices in the field. Literature reviews support the definition of a structure and ease adopting of a common language by creating a bridge from the already practiced examples. Design practices help us in identifying the current requirements in the field, and crystalize the gap in the existing tools. From these two methods, we derive the observations about the structure of the language that can be developed and nurtured within the educational sector, and further practiced as an established shared one among the ones involved within the field.

2. Levels of user experience within the design field

User experience design and human–computer interaction (HCI) emerged in a world of desktop computers, but now we can state that our experience of digitized services has changed radically in the past 10–15 years (Rowland, 2015). For many of our interactions, such as email systems, social networks, ecommerce applications and more, it is common to use one service across multiple devices with different form factors; furthermore, several services bring us to be part of systems in whom diverse services intertwine. Observed by Hassenzahl (2010), experiences emerge through situations, objects, people, and their interrelationships with the *experientor* (the person who undergoes an experience). It is to underline that

dealing with abstraction of experiences and its representation is quite a complex quest for a creation of a common language within a working field.

Forlizzi and Battarbee (2004) reasoned about a framework of user experience for the design of interactive systems. They formulated the framework from an interaction-centered perspective, lined up with social contexts. Within this perspective, they observed three types of user-product interactions, which, in a context of use, brought three types of experience. The types of user-product interactions are *Fluent*, *Cognitive* and *Expressive*. The first one is automatic, the second one creates a deeper bound and comprehension of a product at hand, and the third forms an actual in-depth relationship to the product. The three types of experience are recognized as *Experience*, *An Experience*, *Co-Experience*. These three types are gradual in their strength in bound and comprehension of a certain product. They refer to the levels of influence and creation of meanings that certain design outcomes can provide to an individual, the end-user.

Jensen (2014) also argues the creation of meanings and values through experiences of certain designed outcomes. This author identified three dimensions of experience: *Instrumental*, *User-experience*, and *Profound Experience*. The *Instrumental* dimension is the physical condition of the product itself, that allows the experience to happen in a certain manner. *User-experience* here relates to flows and relations, by defining the actions that the user is undertaking. The third dimension is the *Profound* one, that shapes the meanings, and answers the question of "why" the user is accepting to be involved in the first place.

It is evident that there are many definitions and reasoning about experience within the design field, and finally these are all conditioned by the aimed use and the nature of design outcomes. Considering the complexity and hybrid nature of the systems we are dealing within our teaching course, we defined three diverse levels of reasoning about user experience. These levels correspond to the profoundness of lived experiences, as in the terms of previously quoted authors, and are the following: *Usability*, *Values and meaningfulness*, *Ethics*. *Usability* relates to the physical pleasantness and ergonomic aspects of a design outcome, as well the ease of comprehension, in terms of affordances (Gibson, 1977). *Values and meaningfulness* reflect the notion of *Profound Experience* defined by Jensen (2014), as well as the *Co-Experience* defined by Forlizzi and Battarbee (2004). *Ethics* represent the upper level of acceptability and desirability of a design outcome, and it depends on a long-term pe-

riod of use and the influences that a solution brings with it. This upper level is conditioned by the use of digital services and platforms, which influence might appear as unpredictable on longer terms, but nevertheless affects creation of a lifestyle, followed by behavioral changes.

3. Communicating projects of design for experience

Even though designing for experiences aims at an intangible final product, it still requires some defined steps of the design process, to be established for supporting a creation of a common and shared language in this field (Buxton, 2007). Buxton (2007) approaches the discussion of such steps in analogy to sketching. He pleads for distinguishing two main aspects of design: the problem solving and the problem setting, as backbones of the design process. These refer to definitions of how something is built, and what is the right thing to be built. From the problems emerging during the design process, methods should be shaped. For e.g., it is already evident that, when dealing with representation of an experience, we are dealing with a representation that contains a temporal component, therefore the drawings should be established accordingly. Buxton discusses drawings as the consequence of matching the appropriate visual language to the intended purpose, where every step within the drawing process is a refinement of the previous one. Therefore, diverse drawings should correspond to diverse phases of the design process.

With the level of refinement of the drawing, the designer communicates the state of the final product, suggesting to the audience if the design solution is closed, or perhaps open for further suggestions. In case the communication should invite for further discussion, the provided visuals should enable further intervention within them, giving space to changes and proposals. In this context, Buxton is proposing five types of rendering of drawings: Sketch, Memory Drawing, Presentation Drawing, Technical Drawing, Description Drawing. Furthermore, he is identifying the abstraction of sketches and sketching, capturing the relevant attributes: Quick, Timely, Inexpensive, Disposable, Plentiful, Clear Vocabulary, Distinct gesture, Minimal detail, Appropriate degree of refinement, Suggest and explore rather than confirm, Ambiguity.

Within the course of UX that we are teaching, we define major steps of the process suitable in a design for experience approach, and discuss the correspondent visuals for the same. This process reflects the translation of research into a final product, while defining how we arrived from

mapping of contexts and touchpoints, to the information architecture and final product.

Garrett (2011) discussed about the elements of User Experience that refer to screen interfaces for websites and mobile applications. In our course we are dealing with projects of hybrid nature, where the interaction points are both physical and digital, and the experience is observed in a holistic manner within complex service systems. Even though the field of intervention is expanded, we are still referring to the main steps of the design process defined by Garrett, as they correspond to the scope of the projects. There are five main steps that lead the process from abstraction of the problem setting (what is the right thing to be built), to the concrete definition of the problem solving (how to build it). Observed within this scaling line, the sequence goes as following: Objectives, Scope, Structure, Skeleton, and Surface (Figure 1).

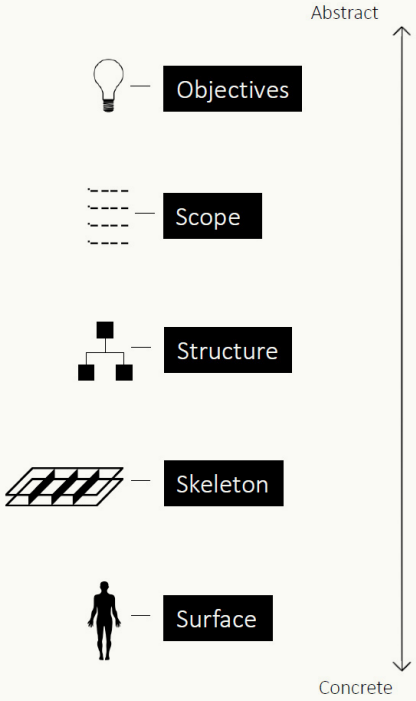


Figure 1. Five steps within the UX design process, based on the definition provided by Garrett (2011).

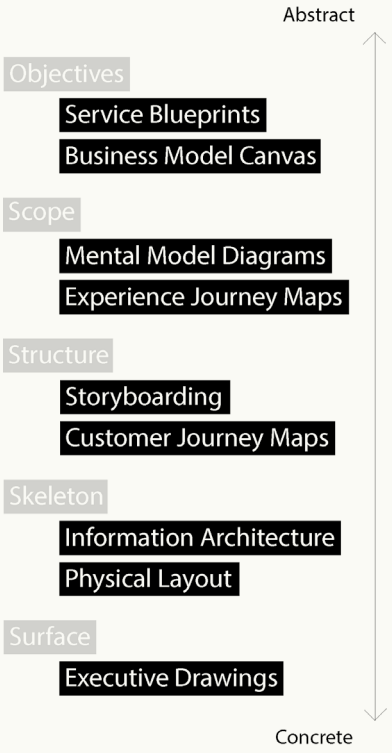


Figure 2. Visual tools that correspond to the steps within the UX design process, introduced during the teaching course.

Following the main five steps of the UX design process, during the UX course, we introduced diverse visuals correspondingly (Figure 2). The visuals were used as a base for exercises by the students, aimed at analyzing existing services of hybrid nature, from the point of view of the interactive surroundings. The visuals referred to those currently most spread in use and known in the working field. The first step, definition of *Objectives*, relates to what is recognized as System Maps, and uses, as visuals, the models of Service Blueprints and Business Model Canvas. These representations are suitable for the initial phase in whom the main questions of the design process are being posed, considering to whom the final product is aimed for, and what are the connection flows with all the parties involved and influenced by it. The *Scope* relates to a more detailed analysis of final users, and it uses, as visual tools, the Mental Model Diagrams and Experience Journey Maps. Definition of a *Structure* implies the analysis and setting of Storyboarding and Customer Journey Maps. Mapping a story indicates mapping out an intended experience of use, the same as one would do for a story – plot point by plot point (Lichaw, 2016). A journey is a schematic way of representing in detail the elements of activities one is designing for, and it may indicate the circumstances and levels of satisfaction and pain points observed from the side of the user. The *Skeleton* outlines the Information Architecture and Physical Layout for the structure of the final solution to be built. The final step, *Surface*, deals with executive drawings for the final design outcomes of both physical and digital shape. The whole design process we are dealing with is oriented toward the user's satisfaction and the identified needs and perception; therefore, all the previously mentioned representations reflect the alignment of values between the final users and the parties involved in the offerings related to the design solution.

4. Structure for mapping of user journeys

Considering the visuals currently used for envisioning user experience within design projects of UX, we can see some evident patterns being repeated. These patterns correspond to the emerging need of the definition of physical/digital structures in the project process focused on experiences; most of the recurrent pattern are explained in the following.

Kalbach (2016) identified the importance of structures based on alignment of values as seen from the side of the users' perception with respect to the side of the institutions offering services (Figure 3). *Align-*

ment diagrams is an umbrella term for any map that seeks to align – or map the lack of alignment – about how individuals accessing to a system engage with that system itself and its provider. According to Kalbach, the term alignment diagram refers to any map, diagram, or visualization that reveals both sides of value creation/perception in a single overview, connecting the dots between human-centered design and business objectives. Mapping for alignment is the base for framing and sharing several design opportunities aimed to innovate and improve the existing services.

In describing the side of individual's experience, Kalbach proposes to include some of the following typical aspects: Physical (artifacts, tools, devices), Behavioral (actions, activities, tasks), Cognitive (thoughts, views, opinions), Emotional (feelings, desires, state of mind), Needs (goals, outcomes, jobs to be done), Challenges (pain points, constraints, barriers), Context (setting, environment, location), Culture (beliefs, values, philosophy), Events (triggers, moments of truth, points of failure). On the other side of the alignment, the elements that describe the organization can include: Touchpoints (mediums, devices, information), Offering (products, services, features), Processes, (activities, workflow), Challenges (problems, issues, breakdowns), Operations (roles, departments, reporting structures), Metrics (traffic, financials, statistics), Evaluation (strengths, weaknesses, learnings), Opportunities (gaps, weaknesses, redundancies), Goals (revenue, savings, reputation), Strategy (policy, design making, principles).

Some of the most common representations are the chronological ones, as an experience is happening within a certain timeline that can be defined through a sequence of stages recognized as main activities. Newbery & Farnham (2013) identified an overall framework (Figure 4), in whom the number of stages depends on the nature of the product or service, the customer's purchase process, and how the product or service will be used. Every stage further is described in detail, but the backbone of the representation are these main activities. According to the approach of the authors, it can be used for developing or adding stages to a customized version for a specific business.

Kaplan (2016), from Nielsen Norman Group, decomposes the customer journey structure into a model of three main zones: *The Lens*, *The Experience*, *The Insights* (Figure 5). *The Lens* deals with constraints of who's experience is being mapped, by defining a persona (Cooper, 1999) and its goals and expectations, related to the scenario to be examined.

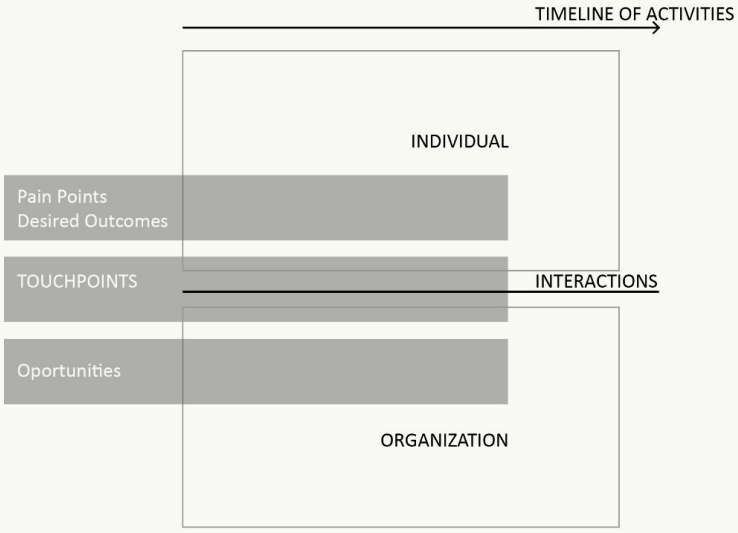


Figure 3. The foundation of a structure for alignment diagrams, based on the observation provided by Kalbach (2016).

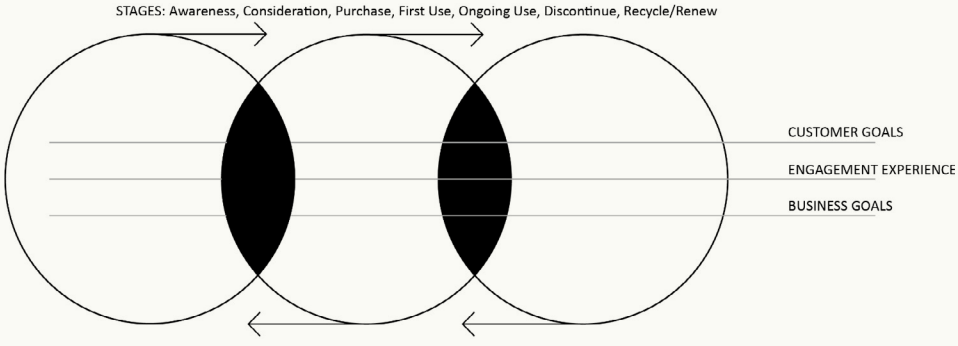


Figure 4. Foundation of structure focused on timeline stages, based on the observation provided by Newbery & Farnham (2013).

The Experience zone contains the main phases of the journey, actions, thoughts, and emotional experience derived from the persona. For representing the emotional experience, Desmet (2002) established a framework in whom he proposed an abstraction in comprehension of emotions suitable for the design field and user-oriented projects.

The third zone, *The Insights*, relates to the output derived throughout the process, that varies based on the business goals that the map supports. This output describes the opportunities and pain points encountered, as well as the internal activities and ownership, from the side of the service provider.

Schauer et al. (2013) discuss the building blocks necessary for mapping experiences. They developed a framework to guide the discovery and research work required for such mapping process. Experience mapping, according to them, consists of four steps to making sense of cross-channel customer journeys: 1) Studying customer behavior and interactions across channels and touchpoints, 2) Collaboratively synthesizing key insights into a journey model, 3) Visualizing a compelling story that creates empathy and understanding, 4) Following the map tonew ideas and better customer experiences. The main building blocks of the journey, extracted through user analysis, are the following three: *Doing*, *Thinking*, and *Feeling* (Figure 6). These derive from qualitative and quantitative research about potential users. *Doing* refers to key actions the customers are taking in order to meet their needs. *Thinking* reflects their expectations and the way they frame and evaluate their experience. The highs and lows of the encountered emotions along the journey relate to the building block *Feeling*. The authors propose also to consider the building blocks that depicture the context in whom an experience is being shaped. Therefore, they propose to add also the following: Place, Time, Devices, Touchpoints, and Relationships.

Brugnoli (2009) proposes a matrix that can be seen as a scheme of many possible user interactions within an interactive system (Figure 7). The author discusses mapping of experiences within complex systems of connected devices. The matrix consists of touchpoints, as any physical or digital element of the system with whom the user comes into contact, and main user actions and intentions. Between these two main elements of the matrix, there are the intersection dots that enable creation of scenarios in which the user puts together available parts to achieve personal goals. The same touchpoint can play diverse roles within the experience, and therefore enable diverse configurations of experiences for diverse personas with diverse goals and action flows.

The main compositions with specific focuses, that emerged from the above-mentioned mapping systems, help defining common structures in mapping of user experiences. The three main groups are shaped, that brought together the foundations of discussed mapping schemes:

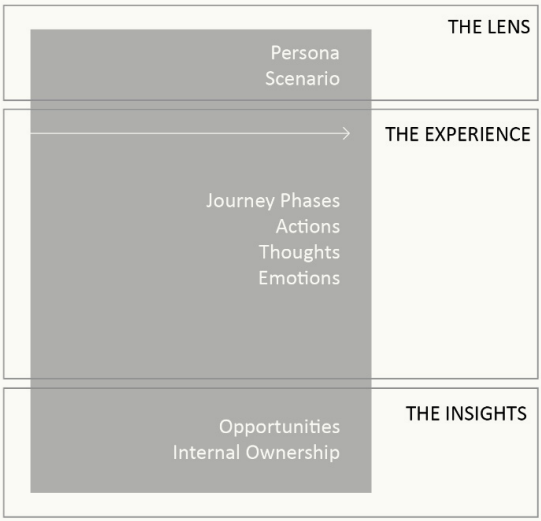


Figure 5. Foundation of structure focused on zoning, based on the observation provided by Nielsen Norman Group (2016).

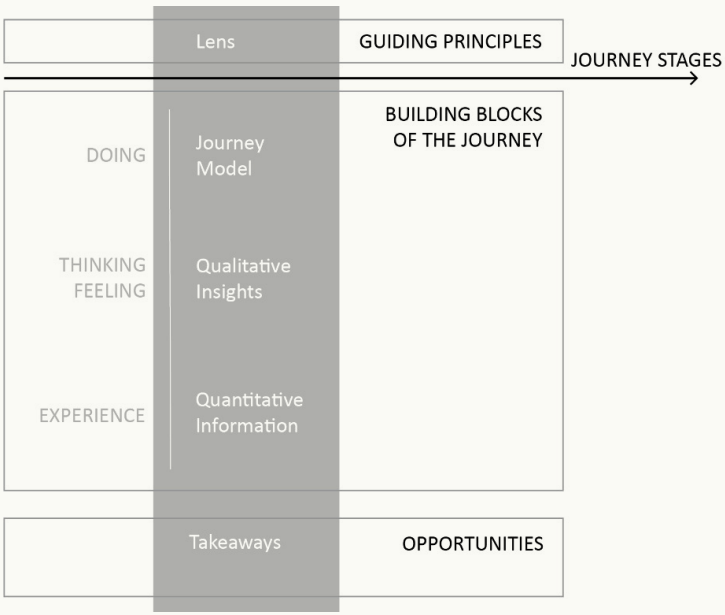


Figure 6. Foundation of structure focused on building blocks, based on the observation provided by Adaptive Path (2013).

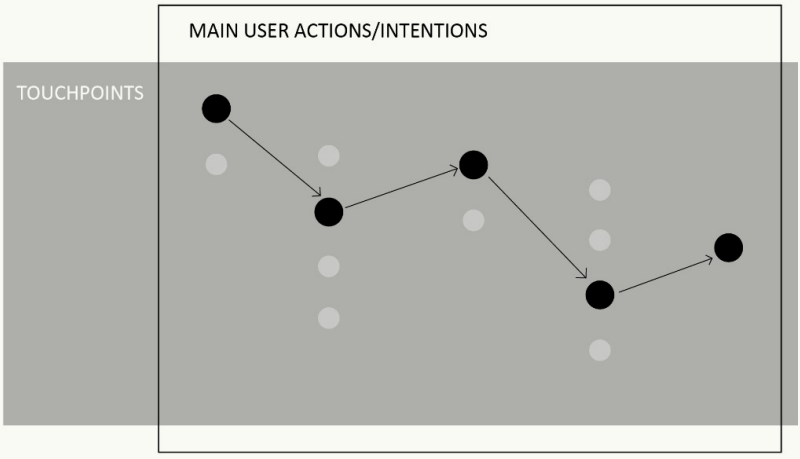


Figure 7. Foundation of structure focused on matrix of intersection dots, based on the observation provided by Brugnoli (2009).

1. Definition of user profiles, users' needs, emotional states, perception and comprehension of posed interactive systems;
2. Touchpoints of posed interactive systems, with phases of actions and interaction flows within;
3. Alignment between the users perceived values and goals, with the offered values and set goals from the side of service providers.

The previous three groups refer to the content of mapped experiences, while the structure for representation of the content can vary. The most common elements that repeat through structures are the ones based on timeline of actions, spatial and physical configuration, hierarchy and zoning of content.

5. Discussion about the User Journey structure

5.1. Analyzing the existing User Journeys

As observed from previously mentioned examples for mapping of experience journeys, when merging them all together, there are main common points extracted that contribute building a common structure for mapping of user experiences. These are: 1) Personas, 2) Timeframe, 3) Sequence of activities, 4) Touchpoints, 5) Perception of the user, 6) Alignment with

business opportunities. However, it is to point out that the extraction of the structure happens exactly when the examples are merged, while looking them separately, it is evident that the structures vary considering their content. Kalbach, Newbery & Farnham, Kaplan, and Schauer et al., in a very abstracted and generalized overview, do strive for the principle of the alignment with a business through a timeline of activities. Observed in a less abstracted manner, they treat the structure of the user analysis and content quite differently. For e.g., Newbery & Farnham discuss a journey already predefined by certain steps, while Schauer et al. stand for a thorough research of possible activities by setting only the parameters for evaluating an experience. Furthermore, it is to point out the fact that the authors, even though aiming for a representation of the same terms within the map, they tend to call these with a different name. For e.g., *Figure 5* and *Figure 6* evidently represent a same way of reasoning about mapping of the experience, yet they still appear different in the way they are communicating with their labels. Schauer et al. propose parameters for examining building blocks of users' experience according to qualitative and quantitative research results, and Brugnoli is also approaching this idea in his own manner. Namely, he stands for an update of the structures adapted for the experience among interconnected device systems and observes a matrix that serves for building a journey according to all the possible activities among the touchpoints within the system.

The mismatching between the journey mapping examples described above happens due to the following reasons:

1. Correspondence to the mapping of an existent or new user scenario;
2. Correspondence to diverse design phases;
3. Correspondence to diverse design outcomes.

5.2. Updating the User Journey structure

Within our research, we are seeking for the common elements defining the structure to be used in systems we defined as complex and hybrid by nature, i.e. the context-aware ecosystems and ambient UX. In our design practice, we faced two projects that correspond to this nature.

One was developed in an automotive environment and is related to an introduction of digitized services that support safe driving behaviors. This digitized system is based on connected devices, among which:

1) smartphone as a base that supports notification of a personalized assistive system, 2) smartwatch for extraction of biological data of the driver, 3) on-board diagnostic unit (OBD) for extraction of vehicle performance data. The system aims at providing support for safe driving to drivers accepting to have their bio-parameters and driving style monitored; the system was managed within a multi-stakeholder environment, among which also the insurance companies that offer personalized policies according to provided generated data about context and behaviors.

The second project we dealt with was developed within a hospital environment and relates to digitization of services offered to the patients inside of the hospital center. More precisely, these services refer to the whole process of the patient examinations and intervention, from the booking of the visit to the finalization of administrative procedures and follow-up. The specificity of the project is the physical presence of the patient within the medical center and the mixture between operation being made through counter desks and digital kiosks. These two projects are very challenging in their complexity, therefore, facing them with the existing tools of UX ended up with making adjustments and upgrades of the design visuals during the design process.

According to Shedroff (2003), experiences (and, by default, products, services, events, etc.) are much richer than most design processes reflect. As it derived also from the two projects previously mentioned (within the hospital and automotive environment), dealing with experience design implies dealing with the overlapping of diverse known and practiced design fields: service, communication, interaction, product, and interior design. The overlapping leads to a creation of holistic experiences and perception of the posed design delivery. However, the complexity of such projects does not mean that we have to deal with all the elements immediately within separate fields of design, as they are considered to be at the moment. Rather, we are to reason about an abstraction of a structure to be used as a base for developing design projects that deal with experiences. This is where the term Ambient UX comes into place, and calls upon a definition of a shared language, which carriers are the common structures practiced during a design process.

What is in common for all the previously discussed maps is the fact that they are activity-based designs (Dalton et al., 2016; Carvalho & Goodyear, 2017). People are always in an environment that consists of contexts and technologies, in whom they are engaged in activities (Benyon, 2014). The activities are enabled within an ecosystem seen as a network of inter-

actions. An ecosystem essentially describes a network of interactions, among organisms, and between those organisms and their environment, which together create an ecology that is greater than the sum of its parts (Levin, 2014). Within the design ecosystems, designers should ensure the consistency and continuity of enabled activities.

Within our research, based on literature reviews and practical experiences from the projects in the user experience design field, we argue about a structure based on a particular foundation. Namely, we are basing the mapping of the User Journey on the foundation of enlarging touchpoints through definition of limits/enablers of activities within it. Considering that user activities are the core of mapping of experiences, we observe the limitation and enabling points of such, as the base for developing a design project. Norman (2013) discusses design outcomes as constraints, as they provide to the user a number of possible actions that are limited. These limiting/enabling points of activities are starting points from whom the pain points and desirable experiences emerge, from the side of the user. These further correspond to the opportunities for the stakeholders that offer services and guide their modification. The User Journey is placed in the *Structure* phase of the design process, that leads to definition of the *Skeleton* (Figure 2). Therefore, it needs to possess a structure that directs the discussion among project partners towards a shaping of a more concrete definition of design outcomes.

The nature of design produced outcomes is dictating the main parameters for mapping, thus reflecting the nature of limiting/enabling points. The parameters are the activity enablers through time and physical space, information flows from diverse sources, and all enabled interactions with the entities seen also through human relations. In the ecosystem of networked interactions, we can define levels of diverse architectures of limits/enablers that reflect the introduced parameters (time, space, information). All of the three architectures intervene and influence each other, and all of them contribute to coherency of fluid transitions within the ambient user experience. Next to spatial and temporal architecture, the information architecture emerges as inevitable component strongly characterizing ecosystems supported by digitized platforms, with whom we are dealing with. Information architecture defines intangible structures that support users' needs, realized both in the digital space as apps and websites, as well as in the physical space as objects such as maps, signs or physical structures (Benyon, 2014). In this evident discipline overlap within information architecture (Saffer, 2009), the structure of content

has to be organized taking in consideration all the diverse information sources and the most suitable optimization and organization of content, avoiding information redundancy and providing clear communication. When designing for experiences, it is to consider traversing different domains (limiting/enabling points) in order to communicate successfully, complete a task, or elicit a desired physical, mental, or emotional response (Grossman, 2006). The movement between domains Grossman identified as Bridge Experience.

It is to underline that the activities that the user is undertaking are happening in certain contexts (Benyon, 2014; Rowland, 2015). The context is not only perceived as the stage for activities, rather it is the part of the development of interactions themselves. In projects of design ecosystems, we are dealing with, the ones previously described, we should embrace complexity of their nature (Norman, 2011). For the mapping structure based on limiting/enabling points, we further differentiate two groups of these points that consider the apprehension of contexts. Namely, one group of them refers directly to the limits and enablers already present in existing contexts that surround the user, while the other group is linked to the limits and enablers of activities introduced within the elements of the new designed service system. The interweaving of the two groups strongly influences the usability, creation of values and meanings, as well as ethical issues from the side of the user.

6. Conclusion

Taking in consideration the nature of the projects we are dealing with, identified as complex and hybrid, and the UX design tools practiced in the field, we observed the need for establishing a shared language. The sharing point is happening between diverse stakeholders of the projects, the design team and the team in charge of the execution of final design outcomes. This language does not refer to standardizing graphic refinements of the shared representations within a project, rather it calls upon a definition of a standardized structure in terms of communication within diverse steps of a design process. Such a shared language within the design community appears enigmatic to identify at the moment. This is due to the fast-evolving nature of projects and subjective approaches in communication that are lead only by the specificity of needs of each project itself. As described above through the examples, there are certain key elements that can be extracted in order to support the creation of a

shared language, but the standardization of the structures is yet only apparent. The reason for this state, is the use of mapping such as a User Journey within diverse scales of a design process, that consider diverse elements of intervention and diverse expectations of result analysis that such maps should provoke.

Within this paper we discussed in particular the structure of User Journey mapping, as a tool used within the *Structure* phase of the design process. The mapping of such a structure is activity-based, and supports the established elements extracted from the cases of existent maps, such as: timeframe of actions, profiling of users, touchpoints, and the alignment that should be happening during all the phases of the design project. Furthermore, we proposed an enlargement of the structure element of touchpoints that will further lead to definition of architectures needed for the production of final design outcomes. The architectures refer to the limiting/enabling of certain activities within the network of interactions. The nature of these points divides according to physical characteristics and sensations, length of time available, flows and sources of information, and human relations. Furthermore, the network of interactions differs also according to the notion of present contexts and introduced new elements.

Creation of a shared language is observed as a necessity for dealing with design projects of peculiar nature within the multi-stakeholder environment, as well as within the educational sector. The standardization of communication structure here is happening on the level of the whole design process, considering different purposes and finalization steps. Furthermore, a detailed standardization is proposed while examining the particularity of the User Journey tool. The research opens the debate about the shared language and poses as an aim further detailed definition of structures of other practiced shared references within the UX field.

Milica Pavlovic
PhD candidate, Politecnico di Milano,
milica.pavlovic@polimi.it

Margherita Pillan
Associate professor, Politecnico di Milano,
margherita.pillan@polimi.it

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Designing with Living Systems

a pedagogical tool for basic design education

Raul Peireira-Pinto, Stefano Pugliese

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Designing with Living Systems

Abstract

In this paper we describe how the elective course – Biomaterials: Designing with Living Systems – was planned and implemented to fit the existing demands of the ongoing undergrad Industrial Design program, offered by the Faculty of Fine Arts and Design of the University of Economics of Izmir.

The course has in its genesis two main pedagogical concerns: to reinforce basic design principles through a new media, and to broaden the students' understanding of design as a cross-disciplinary problem solving process.

Throughout the semester, students were given practical exercises to instigate them on doing fieldwork in order to analyse and register the day-by-day routines of existing biological systems in the surroundings of the campus, and in controlled environments. Following this, students were assisted in identifying and understanding morphological, physiological and behavioural characteristics that influence a specific living actuator (single individual or a superorganism) that has impact on form giving/manipulation of the system, in a distinguishable way and that can be furthermore manipulated.

After understanding a variable that influences the spontaneous form giving of a biological system, students were challenged to test tools (as little invasively as possible), that would allow them to manipulate the systems, looking for ways to gain some control over the final formal outcomes. The manipulations should disrupt the quotidian biological activities of the systems and of its individuals as little as possible. Furthermore it should allow a strong influence upon the systems' self-form-giving and a planned relation between: the initial design hypothesis, the tools to guide the biological actuator and the final outcome.

Throughout the first two years in which the course has been lectured, students were free to choose any living system that most attracted their attention, leading to a great verity of tested biological actuators: honeybees, various strains of mushroom mycelia, ants, different vegetable sprouts, moss, bacteria and silkworms. This approach, lead to a wide and varied scoop of actuators, which was interesting but also lacking a strategic research plan. With this in mind we decided that in the future, all students should focus on local honeybees and silkworms. This decision was based on two main reasons: the very high level of domestication of these biologi-

cal actuators, leading to less invasive interventions and an easier to control over the systems, and the existing empirical knowledge that outcomes from the strong sociocultural heritage that the Aegean region has on farming silkworms and honeybees.

We consider that working with biological living systems, reinforced students' notions of basic design principles, gave them better notions of system-design with in a specific context and with specific constraints; it also gave them new ethic softs skills, and a border notion of a designers responsibilities as an interspecies mediator.

Theme: Language
Keywords: living systems, design education, biomaterial, basic design, local production

1. Introduction

Having been presented with the challenge to elaborate an elective course, that would complement the core structure of the undergrad Industrial Design program, offered by the Faculty of Fine Arts and Design of the University of Economics of Izmir, the effort was focused on elaborating an option that would attract students' curiosity, as well as offering them the opportunity to broaden their notions of design, potentiate problem solving in cross-disciplinary contexts and that would fit the areas of expertise of the designated lectures. The *Biomaterials: Designing with Living Systems* elective course is the outcome of this exercise.

This paper looks to present how the course was thought out and structured, the constant incremental changes that have been employed in order to grantee continuous improving and some of the resulting outcome achieved by the students. We intend by presenting this case to contribute to the discussion of the role of design and designers when defining the future form of living materials, and to prepare the future works within the course itself.

2. Motivations

With the mindset that the course should have in its genesis two main pedagogical concerns: to reinforce basic design principles through a new media, and to broaden students' understanding of design as a cross-disciplinary problem solving process. Designing in/with living systems

emerged as the right media to approach these two vectors. On one hand itgives the opportunity to question design in its border signification – as something basic to all human activity, from farming to "composing an epic poem", from "baking an apple pie" or "educating a child", adding that it is not only about "conscious [acts but also an] intuitive effort to impose meaningful order" (Papanek, 1984), this is design as being "intrinsic to human behavior" thus an "attitude to understand the everyday, to anticipate and react on it" (Matevz, 2015).

On the other hand, the openness and complexity that is intrinsic to a living system, enforces a cross disciplinary approach in order to better understand the system, and what contextual aspects influence its morphogenesis, as László Moholy-Nagy wrote, "We need to bring many types of knowledge into design" (in Caccavale, 2014). By designing in/with living systems, the outcome in most cases is non-deterministic; this too questions the most traditional design definitions, where form is seen as the "ultimate object of design" (Alexander, 1964). In this scenario, design is more about understanding and mediating existing spontaneous biological form generation than it is to focus on the final form-giving aspects. Being "designing an activity that is constantly changing", we believe that this course can contribute to the epistemology of "something that has no fixed identity" (Margolin, 1995).

3. Course structure

Experiential learning is the structuring paradigm, where the balance between thinking and making is the format to stimulate learning (Stables, 2007), as Donald A. Schon describes in his book The Reflective Practitioner: How Professionals Think In Action, there is a synchrony between making and thinking, that can be referred to as a 'conversation' between the designer and the matter (1983). This "current trend [of] bringing making into education, to stimulate learning through making" (van der Poel, 2015), is not a new one, as Frayling argues while talking about the role of craft in design education when he affirms that the famous phrase "we must all return to the craft" by Walter Gropius in the Program of the State Bauhaus in Weimar (1919), was mistranslated. What Gropius really wrote was "we must all turn to the craft", and that Gropius didn't see Craft in its traditional definition but as a "research work for industrial production, speculative experiments in laboratory-workshops where the preparatory work of evolving and perfecting new type-forms will be done"(2011). This idea

is reiterated by Otl Aicher in Analogous and Digital, stating that "we must move over from thinking to making and learn to think by making" (1994).

With the above assumptions in mind, the course was structured to promote activities as observation, tinkering, playing, gathering, sketching, experimenting and predicting instead of focusing on more conventional design activities of convergent thinking that narrow down options towards a final singular solution.

3.1. First edition structure

In the first edition of *Biomaterials: Designing with Living Systems* elective course, spring 2016, students were given practical exercises to instigate them on doing fieldwork in order to analyze and register the day-by-day routines of existing biological actuators (single individual or a superorganism) in the surroundings of the campus. Organized walks were scheduled, where students would be asked to identify biological spontaneous activities that had significant impact on form-giving/manipulation by a biological agent on its environment; bird nest building, anthill digging, moss growth, fruit ripening and mushroom sprouting were among the main points of interest. During the fieldtrips, they were asked to register there finding through sketches, photographs and writings in a scrapbook, and that this process should be repeated throughout the following days, seeking for clues on what contextual aspects influenced form giving options by the biological actuator.

Following this, students were assisted in trying to identify and understand what "external natural events" motivated specific outcomes to the system's form-giving. Six aspects were under scrutiny: 1. morphology – its form (dimensional and geometrical configuration) and structure (what



Figure 1. 1st edition final exhibit.

elements were used and how they are rearranged between themselves) (Thompson, 1917); 2. physiology – the way in which a living organism or bodily part functions; 3. anatomy – the physical structure of an organism; 4. behaviour – how does it repeatedly react in response to a particular situation or stimulus (Bergner, 2011); 5. origin – The point, place and phenomena that gave origin to the event; 6. distribution – The way in which the event is shared out among a group or spread over an area.

As a third phase, students were organized in groups of 2, each group should chose a biological actuator and in a controlled environment try to manipulate the systems (in the less invasive form possible), with an intended outcome in mind. Honeybees, various strains of mushroom mycelia, ants, different vegetable sprouts, moss, bacteria and silkworms, were the subject of the students' experiments.

As the final outcome students curated an exhibition and submitted a report where they describe their findings and propose future applications.

3.2. Second edition structure

After a critical analysis based on the previous semesters' outcomes and students feedback, the second edition of the course was restructured in order to try a more formatted approach, that would allow better time optimization and for students to engage the challenges in a more focused manner. Thus, two modules were defined in order to give the students a more defined and limited field of research: one theoretical that would help contextualization to the subject and one application unit where students could explore new design opportunities.

Additionally and opposite to what had been done in the 1st edition, where the objective was to get students to contact with as many systems

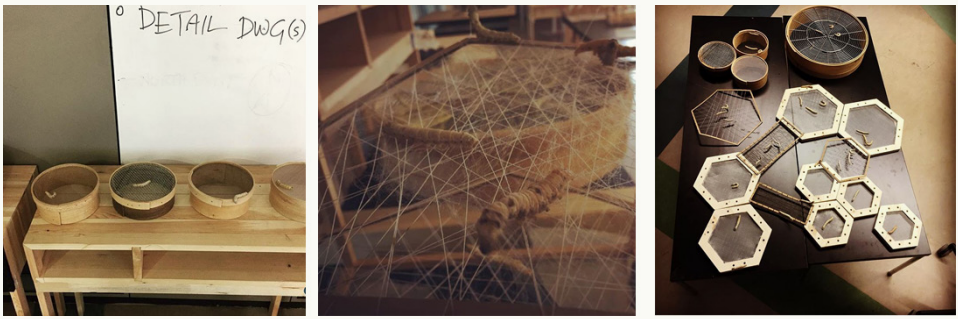


Figure 2. 2nd edition final exhibit.

as possible, in the 2nd edition it was decided that all students should work with the same biological living agent: Silk Worms. The choice of silkworms surfaced from two main reasons: the very high level of domestication of these biological actuators, leading to less invasive interventions and an easier to control over the systems, and the existing empirical knowledge that outcomes from the strong sociocultural heritage that the Aegean region has on farming silkworms.

The choice of working only with one agent was supported by three main motivations: 1. to allow students a more focused approach and to cooperate themselves with the Silkworm breeding; 2. the existence of a strong local implementation of textile industry with a long heritage on silk production, in the Aegean region of Izmir in Turkey (mainly in the town of Odemiş); 3. the large availability of Mulberry Trees (Genus *Morus*) both in the city of Izmir boulevards paths as in the Izmir University of Economics Campus.

In the theoretical module, students were introduced to the basics morphological, physiological, anatomic, behavioral, origin, and distributional, aspects of many biological actuators and in particular silkworms. A series of case studies were also presented and analyzed, with particular emphasis given to the experiments and works developed by the MIT – Mediated Matter Group that is focuses on Nature-inspired Design and Design-inspired Nature (2018)

The objective of understanding from the theoretical point of view, how living agents had been used and involved in the Design practice, led the students to focus with a critical eye on the limitations, failures and successes of their and their colleagues' works.

In the second module students were asked to state a design hypothesis and simulate scenarios through the use of basic geometrical forms (Triangle, hexagons or circles) were the silkworms could operate and cooperate in the generation of patterns in a three dimensional environment.

During this period, students were requested to record and follow the breeding of the Silkworms and build their three dimensional structure to test their design hypothesis.

4. Outcome

We believe that the greatest result from the given assignments was to instigate students into questioning everything about their natural surroundings and not following "absolute truths". Although most of the chosen bi-

ological agents inhabit their surroundings, and that the students crossed paths with them on a daily basis, they had never really stopped to look at them and try to understand what they were about. The assigned tasks opened the opportunity for students to have a critical analysis on everyday life and on how humans in general tend to abstract themselves from their natural environment, forgetting that nature too is, or can be designed and that designers have the responsibility to constantly question their (natural as much as artificial) surroundings. As Hegel compiled in his quote "what is familiarly known is not properly known, just for the reason that it is familiar" (in Celik, 2015).

Working with living biological actuators, also turned out to be a little frustrating for the students, the lack of a closed brief, the ability to only partially control the systems and the long waiting periods sometimes needed when working with the living systems were the main aspects of discontent. Thus a new mindset evolved in the working groups, that "anything living or growing – from spore, to fruit, to soil, to compost – experiences constant pressure to transform" (Kuzmanovic, 2006), and that those forces must be considered and seen as collaborators; and that "nothing which is perfect can be truly alive" (Alexander, 2002), leading to new aesthetic experiences, different from the ones offered by the material world.

In many occasions students throughout the courses experienced and expressed some frustration in not being able to imagine or describe be-

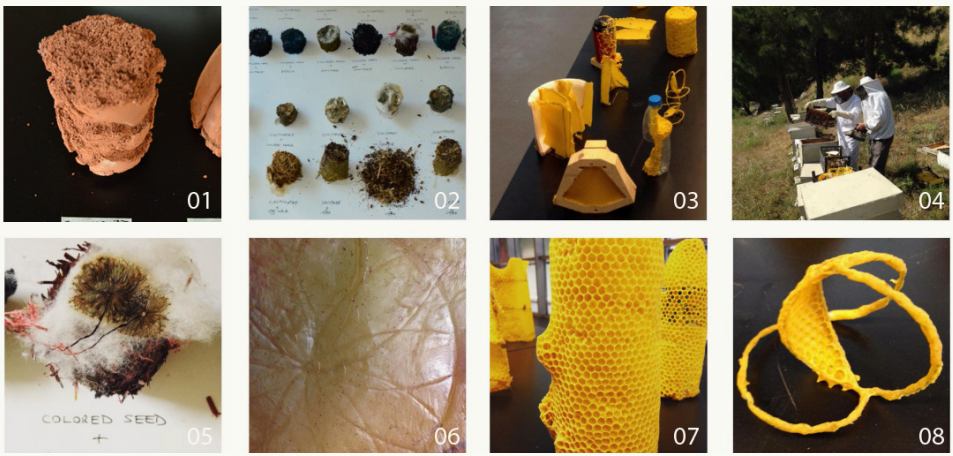


Figure 3. Thumbnail from 1st years final exhibit: 01 – clay burrowed by ants; 02 – mycelia in different subtracts; 03 – tests with honeybees; 04 – fieldtrip to local beekeepers; 05 – mycelia and natural dye test; 06 – bacteria and yeast test; beeswax on plastic extruded by honeybees test; beeswax on wire extruded by honeybees test.

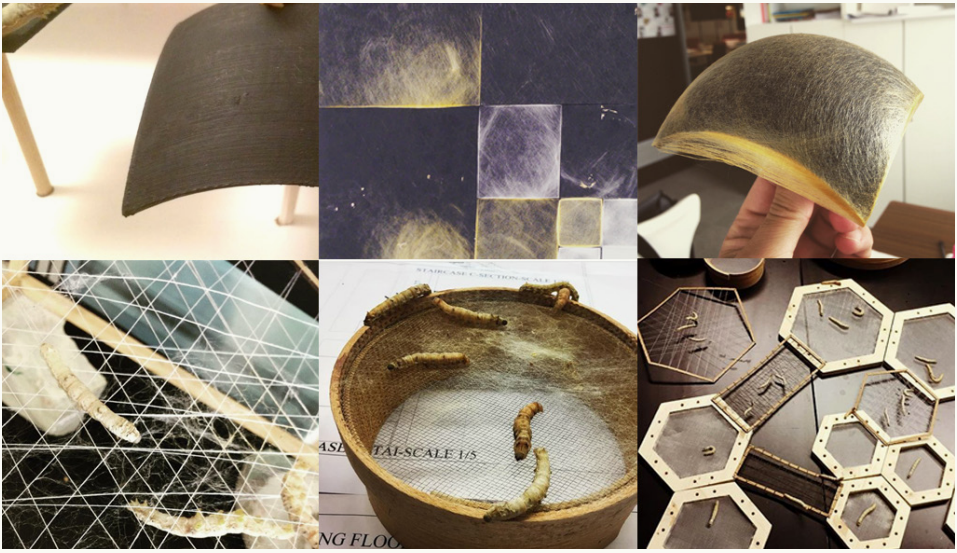


Figure 4. Testing with silkworms Thumbnail from 1st and 2nd edition: 01 – testing limits of convexity; 02 – testing dimensional limits; 03 – final cocoon weaving; 04 – testing foundation materials; 05 – testing multi worm weaving; 06 – final exhibit piece

forehand the final design output. Nevertheless, the final works of some students that carried on their work into their final graduation project, actually revealed that they were able to reach a final result that through a traditional design process led them from hands-on experiments to their final expected outcome. Leading to the idea that this course gave them the experience and basic tools that can be useful for student that decides to carry on further work under this subject.

5. Interpretation of results

We consider that by working with biological living systems, students' notions of basic design principles were reinforced, that the openness of results in these systems contributed for them to gain better notions of system-design with in a specific context and with specific constraints; it also gave them new ethic softs skills, and a border notion of a designer's responsibilities as an interspecies mediator.

Through the observation of the outcomes we can understand that students need closed briefs in order to apply their findings and get lost inthe specificities and complexity which are innate to living spontaneous systems.



Figure 5. Final graduation project by Berk Babayiğit – Pendent Lamp, Silkworms as Co-Designers

Most of the students who attended the course were in their third year of Industrial Design Education encountered difficulties in challenging a project without a functional product oriented scope, a future objective is to attract younger students that are less formatted in their way of thinking.

On the other hand the course was successful as it opened new perspectives to the students and offered them a methodological approach that may help them in the future when faced with complex design problems and encourage them to experiment on new design process materials and fabrication processes.

In summary the following goas were achieved:

Better understanding of: how and what influences form in a biological system; the need to analyze and register elements that influence a systems function; that ethic skills are part of a designers responsibilities as an interspecies mediator.

Being able to discover: (noninvasive) tools and methods to manipulate form in a biological system; agents that influence growth and activity in a biological system; constraining agents of a biological system that can be hacked in order to tamper with their natural process so the intended final-shapes is achieved.

Design: new experiences in/with biological systems; systems that will grow things not final products.

To acknowledge: ethical and deontological aspects involved when working with living systems; the openness of form giving when working with living systems.

6. Future works

6.1 Course restructuring

In the previous two editions students have been given open practical exercises in order to understand variables that influences spontaneous form giving of biological systems, they were challenged to test tools (as little invasively as possible), that allow them to manipulate the systems, looking for ways to gain some control over the final formal/material outcomes. Students have worked with silkworms, honey bees, ants, bacteria, fungi and several plants looking for tools and techniques that permit a strong influence upon the systems' self-form-giving and a controlled relation between the initial design hypothesis and expected final outcome and how to guide the biological actuator into achieving it.

The third edition will be more focused on addressing designers' responsivities as an interspecies mediator and students will have a closed brief. In this edition a bioengineer will be invited to co-lecture in order to speed the process of understanding the systems, get a deeper understanding of the system and by this, gaining more time for the design phase. This future edition will be structured in 3 stages: 01 presenting and discussing case studies of biological systems that have been hacked or manipulated; Experiments for the observation of living systems: bacteria experiments for color & shape study and experiments with mycelia as well as to forecast the action of the foreign agents on the system; 03 Designing with/in/for biological systems with the intent to generate new food experiences by manipulating the growth of fresh edible ingredients.

6.2 Future research

The experience gained by lecturing the Biomaterials: Designing with Living Systems, opened the path for new research field and collaborations in the Aegean region of Turkey where the climatic conditions are optimal for silkworms and honey bees breeding, and there is a cultural heritage that can be recovered though design.

Despite the fact that Turkey in the past sixty years had seen a dramatic decrease of actors involved in sericulture (The production of silk and the rearing of silkworms for this purpose). The families involved in Silkworm breeding were in fact nearly 70 thousand in 1950s, this number decreased to little more than 2500 in 2012 (Yilmaz, 2017). This statistics clearly shows a drastic shift in the Turkish industrial textile production.

Today the numbers continue to decrease and the empirical knowledge is vanishing with it´. Local private and public foundations are funding small scale silk production units as social innovation projects where we intent to contribute adding design as the key tool to reinterpret the material and the practice. The Weave Your Future with Silk carried out by Sabancı Vakfı project has invested more than 25.000 euros to empower women entrepreneurship in Odemis by revitalizing sericulture (Cooperative, 2013).

This movement may be seen with optimism and as an opportunity for future research and collaborative applied projects carried out with students. Crossing design with traditional craft and farming activities, can eventually be framed to be in the future editions of such projects and allow students to cooperate with theas local women cooperatives not only to grow social awareness but also provide alternative production methods and market opportunities.

Raul Peireira-Pinto
Industrial Designer,
University of Aveiro, Portugal,
raulpinto@ua.pt

Stefano Pugliese
Architect, Lecturer at the Faculty
of Fine Arts and Design, Izmir
University of Economics, Turkey,
sp@stefanopugliese.com

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Caution Roadblocks Ahead!

Hosting a Design Driven Social Innovation Lab in a Research-Intensive University

Sébastien Proulx, Susan Melsop

Abstract

This paper presents the process of setting up a Design-driven Social Innovation Lab in the Design Department at The Ohio State University. The authors discuss the challenges and roadblocks of developing the Lab, and provide a strategic roadmap to surpass them. Because project grounded research still has an ill-defined place in the scientific research landscape, setting up a social innovation lab in a Tier 1, research-intensive university has challenges both seen and unseen. For instance, colleagues across the university may not be aware of how design can be a tool for social change. Additionally, peers evaluating tenure-track faculty may not recognize social design as scholarship but view it only as service and community outreach. In order to overcome these challenges, the authors present an action framework to structure the relationship between community engagement and project grounded research to advance scholarship in social design. This framework serves as a way to reconcile misconceptions around the scientific value of project-based research and close the gap in language between the grammar of project-based design and academic research in the Usonian context.

Theme: Language
Keywords: design research, social innovation, academia, project grounded research

1. Introduction

Over the past fifteen years, we have witnessed a development for social awareness among many design schools. Design departments across the globe have started to host social innovation labs as a way to structure project grounded research (Findeli, 2015; Stappers, 2007) activities and foster partnerships between their programs and community organizations. The labs hosted under the umbrella of the DESIS network are models of this kind of structure (Manzini, 2014). An Innovation Lab typically engages with initiatives intended to tackle contemporary issues relevant to a particular community. The initiatives may be project-based or research led with direct engagement with community partners or indirect

involvement; in either scenario, the resultant aim is that the community[1] is the beneficiary of the study and work.

However, because project grounded research still has an ill-defined place in the scientific research landscape (Gauthier, 2015), setting up a social innovation lab in a research-intensive university has several challenges and faces many roadblocks. One such roadblock is the reflex, particularly of academic peers, to consider the engagement activities hosted by the innovation lab *only* in terms of service and community outreach (Leaman, 2014). Project grounded research, while a strand of action research, is dismissed as less rigorous than scientific research methods. What is missing then from this limited view is the recognition that university-community partnerships can advance teaching and learning, promote research and scholarship, and serve communities in tangible ways toward *real* social changes. The collective "service" labeling of activities spawned within innovation labs creates communication obstacles among faculty, administrators, and funding organizations. This limits; 1) the attractiveness of these labs as research-intensive sites, especially for junior tenure-track faculty under pressure to build their research publication track, 2) access to grant opportunities, especially from federal agencies like the National Science Foundation (NSF) and the National Institute of Health (NIH), and 3) the capacity to engage in cross-disciplinary exchange and transdisciplinary scholarship. The challenge then is to structure a clear roadmap for an Innovation Lab to advance scholarship and research, extend education beyond the campus, and cultivate sustained community partnerships for authentic impact.

This paper will lay the foundation of a framework capable of bridging the conceptual gap between the nature of project grounded research activities and the typical community-led innovation lab projects, and confront what is traditionally valued and expected of scholars at Tier 1 Research intensive universities.

Launching into the process of developing a design-driven social innovation lab in the Department of Design at The Ohio State University, we discuss how grammars of projects and research may be reconciled. We argue that project topics should be considered in terms of a general

1 Community is a complex and loaded concept. As suggested by Lemieux (2009), community can be described as "the horizon called by any action or any judgment." In the context of this paper, we more prosaically refer to the *community* in reference to agents outside of academia.

research axis. Aligning projects within a research axis framework addresses terminology usage and resonates in a language more common in academia. Within such a framework, language barriers are at least minimized if not eliminated, and cross-pollination of research methods is more effective for a large array of disciplines, such as sociology, political science, gerontology and so forth to engage peers outside of a design discipline to participate. Small steps such as these allow project based research to adjust to the context of activation and enable design to engage in interdisciplinary dialogue in academia.

2. Background

2.1 The purpose of Design Driven Social Innovation Lab

The complexity of social and environmental issues, combined with a rapidly changing global economy within the information age has given rise to a variety of challenges for design professionals. Designers work with and on problems, finding or developing opportunities from which to offer solutions. Designers are also those who engage in design thinking which is a similar process but where the scale and complexity of the problem is much larger and the response may not be a physical object (Pendleton-Jullian, 2009). So, although we see tremendous growth of research activities carried out by design professors, researchers and scholars outside the field of design do not always know what design-driven research is, or what contributions design thinking and design doing might have on the pressing problems we face today. In the United States, there continues to be preconception that designers, in practice and academia, are primarily concerned with form. Yet, "notions of the scope of design action have changed." (Poggenpohl, Sato, 2009, p. 8). As expressed in their critical essay on the shifting landscape of the discipline of design, Sharon Poggenpohl and Keiichi Sato state:

> Some designers have moved from the aesthetic configuration that typically happens near the end of a project to the beginning where what may develop is unknown. Here another kind of process unfolds, one initially divorced from physical making and more deeply engaged with processing information and understanding context through the generation of frameworks or conceptual diagrams, defining the problem to be addressed, asking questions, accessing

research, constructing new research, and entertaining possibilities (Poggenpohl, Sato, 2009, p. 8).

2.2 The Ohio State University, a land-grant and Tier-1 Research intensive university

As a Tier 1 research and land-grant institution[2], The Ohio State University (OSU) is uniquely positioned to support a Design Driven Social Innovation Lab. The resources, infrastructure, and established community partnerships (locally and globally) make it an ideal environment to sow the seeds for a forward-thinking, interdisciplinary design-driven innovation lab. First, the resources available are extensive. With 17 Colleges across various disciplines, the university boasts the intellectual capital of more than 40,000 distinguished scholars and staff. As one of the largest universities in the United States, the institute has an undergraduate population of more than 52,000 students and 13,000 students enrolled in graduate and postgraduate programs.[3] Second, the university hosts infrastructure for advanced centers of learning and think tanks that serve as hubs of academic exchange. In addition to this, there is a comprehensive medical center combined with a teaching hospital. Yet, perhaps most significant, is the fact that OSU is a public land-grant university. As such, the university has a long-standing mission to uphold the Morrill Act of 1862, which states that the U.S. Congress "provide grants of land to states to finance the establishment of colleges specializing in 'agriculture and the mechanic arts.' With a historical mission to serve the populace through education extension, The Ohio State University has developed local, regional, national, and international partnerships with community organizations to educate beyond the campus walls. This is precisely the type of fertile ground necessary to cultivate the seeds for research-informed, design-driven innovation lab toward sustainable social change. As an intensive, 'very high research focused university, the tier 1 research ranking of OSU makes it one of the top 2.5% institutions of higher education' among all others in the United States."[4] The criterion[5] upon which institutes of higher education earn the tier 1 research rank also contrib-

2 Land-Grant institution are publicly funded college and university.
3 https://www.osu.edu/osutoday/stuinfo.php#enroll
4 https://www.unlv.edu/sites/default/files/assets/toptier/docs/UNLV-School-Handout.pdf
5 http://carnegieclassifications.iu.edu

utes to the fertility of developing a design-driven social innovation lab at OSU. These metrics include, the receipt of grants and contracts over $1 million dollars a year, the award of upwards of 200 doctoral degrees a year, an increase in research scientist staff (funded through grants and contracts), and graduate rates that exceed the national average of 55%.

2.3 Roadblocks to the establishment of a Social Innovation Lab

All of these factors would seem to make OSU the ideal place to conceive of establishing a research intensive, transdisciplinary[6] design driven social innovation lab. However, challenges and roadblocks are present and require careful navigation. For all the positive elements and potential OSU appears to have to host a design-driven social innovation lab, there are major barriers that need to be confronted and addressed. Of these, preconceptions, terminology use, and language barriers are the most challenging obstacles, particularly in a research-intensive setting. Preconceptions among scholars outside the field[7] include knowing what *Design is* and lacking awareness of what design thinking methodologies are and how their use and implementation can be sources to complex problem solving within traditional research-intensive settings, because research methods are traditionally codified with a scientific approach.

This has a bit to do with the history and development of design programs within the United States. Typically design programs were formed from schools of fine art from a *Beaux Arts* tradition. The specific contextual setting for OSU is a case in point. In fact, the burden of the department of design and the preconceptions it may harbor among faculty outside the discipline may be due to its historical founding. Prior to its independence as a stand-alone department at OSU, the study of design fell within the study of Art. In its inception, design was an area within the School of Art. Traditionally designers were artisan-craftsman; in addition to their craft-trade background, many were formally trained within a

6 We are here adopting the perspective of Findeli and colleagues (2008) who described transdisciplinarity as interdisciplinarity turn into project.

7 For instance, while there are some PhD programs in Design in the United States, the National Association of School of Art & Design (NASAD) still recognize the Master of Fine Arts (MFA) as the professional terminal degree for the the discipline of design. For more detail see: https://nasad.arts-accredit.org/wp-content/uploads/sites/3/2016/03/NASADPolicyAnalysis-Thinking-about-Terminal-Degrees-in-AD.pdf

master-apprenticeship studio environment. Therefore, based on this historic precedent, the alliance of design to the School of Art was logical. However, as the field of product design expanded and grew to include studies in visual communications and interior design with a human-centered design approach, its' philosophical approaches shifted from art and it became apparent that the discipline of "design" should be independent from the School of Art (Gysler, Jones, and Wallschlaeger, 1972).

Despite the fact that design research has evolved greatly over the last few decades (Joost et al., 2016), preconceptions remain about what design is good for. A wide number of colleagues outside design remain oblivious of how design could be utilized for problem identification and problem solving. This has complicated the establishment of research collaborations with other disciplines. Combined with the fact that academic peers are also unsure of how rigorous design research methods are makes it challenging for design scholars to see their work valued and recognized. This, in turn, makes it challenging for design faculty to see their work acknowledged. Access to research funding from the two main research funding agencies in the United States is significantly more complicated.[8] Unlike Canada where designers have a proven track record[9] of accessing research grants from either one of the three scientific research councils – Social Sciences and Humanities Research Council (SSHRC), Natural Sciences and Engineering Research Council (NSERC) and Canadian Institutes of Health Research (CIHR) – design researchers in the U.S. mainly have to rely on the National Endowment for the Arts (NEA) to fund their research endeavor. This proves to be particularly limiting. For instance, NEA grants are often insufficient to cover the hiring cost of skilled research fellows. Moreover, it can become problematic for promotion and tenure of junior faculty. Specifically, the dossier of design faculty in the College of Arts & Sciences is compared to dossiers of faculty from disciplines with highly structured systems of research production. Additionally, colleagues from disciplines, such as psychology, sociology or biology, are the ones reviewing the scholarship and research production

8 In the United States they are the National Science Foundation (NSF) and the National Institute Health (NIH).

9 In 2016 Emily Carr University of Art + Design, a small institution dedicated to art and design, was awarded a Foundation Grant by the Canadian Institutes of Health Research (CIHR), to finance its Health Design Lab. See: http://research.ecuad.ca/healthdesignlab/about/

of the design faculty member. Both of these are considerable challenges that must be met.

3. Setting up a Design Driven Innovation Lab at The Ohio State University

Despite challenges and roadblocks, we are convinced that Design driven social innovation labs can provide a legitimate and effective structure to support academic research endeavors about social innovation. Moreover, our decision to pursue the establishment of a social innovation lab is motivated by the nature of some of OSU's design faculty research activities. For the past eight years Susan Melsop[10] has been organizing and championing an OSU sanctioned service learning collaborative studio[11] called *Design Matters* (Melsop, 2010). During the first four years, the course bought together urban youth with Ohio State students to co-design and build small-scale structures, furniture pieces, and landscape elements for a community art center on the East side of Columbus, Ohio.[12] Each project was completed by university students and youth from the Transit Arts program, an arts-based, youth development program for urban teens. Since 2017, the course has moved to São Paulo, Brazil where OSU's design students partner with fellow students from Mackenzie Presbyterian University and together work with a marginalized population to design and build projects for a homeless resource center. Other faculty members also conduct project-based research and develop partnerships with organizations like public libraries (Abrassart et al., 2015) and sustainable retail stores (Matheny, 2016); topics range from public health and the visually impaired.

As we argued, these kind of partnerships and projects are valued as they represent good teaching environments *and* they directly contribute to improving the lives of community members. Moreover, we believe they

10 https://design.osu.edu/people/melsop.3

11 Collaborative studio refers to studio activities engaging student from OSU's all three design majors: Industrial Design, Interior Design and Visual Communication.

12 I chose to partner with the non-profit, Central Community House on the Eastside to engage their urban youth in design-build projects as a way to extend architecture and design education to a vulnerable population. The Eastside of Columbus is predominately African-American; it has traditionally been considered an underserved neighborhood with a college graduation rate of less than 36% and yet its residents live within seven miles of a land-grant university.

represent good research settings to examine and analyze the activity of design. As argued by Proulx, Gauthier & Hamarat, (2017) using students' work is a common strategy in design research.

> For one, many emergent fields of practice in design stem from academic research and in that sense universities offer the only context where one can access the data needed to describe and analyze such practices and their outcomes. [...] Moreover, educational environment offers a very flexible context where ideal forms of practices can be experimented and assessed. Of course, such strategy entails a few shortfalls due to unrealistic experimental conditions. One might well argue that the stakes facing real practice can never be matched through educational curriculum. Also, by definition, students, however good they are, seldom show the same level of proficiency than seasoned professionals. (Proulx, Gauthier & Hamarat, 2017, p. 995)

But to avoid the pitfalls and roadblocks identified, an organisational framework allowing to carry a research agenda is needed. In this last part of the paper we present the strategy envisions for establishing such lab structure in the Design Department at The Ohio State University. (See Figure 1)

3.1 The action framework

To become legitimate and respected as a genuine research setting, the work within a social innovation lab must remain focused on the objective of generating new knowledge and training future designers and scholars. Anyone involved in research through projects faces the significant challenges of getting caught up by the design project pitfalls and losing track of scientific research objectives and methodological requirements. Providing a community partner with satisfying results is a mandatory requirement for Social Innovation Labs. Failing to do so would be unethical due to the university-community investment in the project. Therefore, it is essential to maintain equilibrium between conducting rigorous scientific research and providing an impactful design service action to the community partner. The challenges are therefore to develop a win-win-win balanced setting that 1) promotes scientific research and advances the field of desiegn, 2) encourages learning to happen in-situ, and 3) provides benefits to partners.

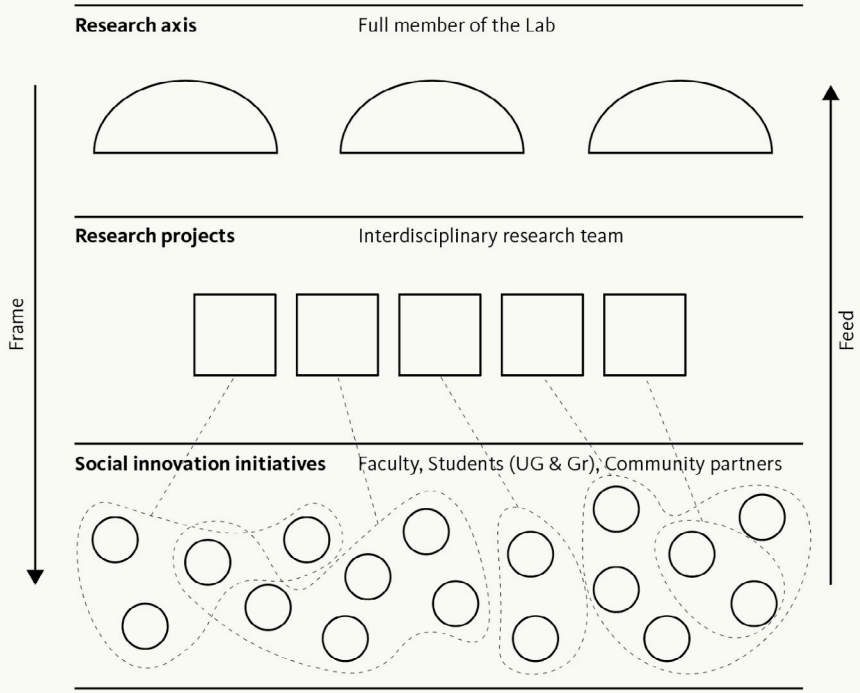


Figure1. Three levels action framework of the OSU Design Driven Social Innovation Lab.

The organizational model envisioned is a three-level structure (see figure 1). Due to the nature of design-driven research activities, this organizational model can be read and utilized either from top-down or bottom-up system. Indeed, despite its vertical nature, this organizational model is meant to allow projects to emerge from community-led commissions as well as from theoretical hypothesis within academia. For the sake of clarity, we will here present the organizational model from the bottom-up perspective, a logic more common to design community readers for whom this paper is foremost intended.

Level 1 – Social Innovation Initiatives

At the first level sit community based design projects. These projects can be initiated by a researcher pursuing a partner for specific research and teaching endeavour or be commissioned by a community partner. Although, in the latter situation it will be expected that the initiative be

associated to an ongoing research project or give rise to a new one. This is a safeguard intended to help filter the multiple opportunities we are often presented with to avoid the multiplication of project types that don't serve academic purposes or the scientific agenda of members of the lab.

Level 2 – Research Projects

Research project sits at the second organizational level. Research projects are led by members of the lab on individual or collaborative basis. As with any research project, their goal is the advancement of knowledges (epistemological, methodological, operational). Research projects may also take different forms, from casuistic study to critical analysis to experimental research. The idea is that no community base projects can be undertaken without a corresponding structured research project. Publishing and dissemination expectation are also expected to ensure that research objectives are met. For instance, all design projects are expected to be documented and presented at conferences. Research projects outcomes also have to be disseminated. On top of that, research leaders are expected to show that their projects and findings are contributing factors to the examination of the research axis. Failing to produce outcomes, or producing outcomes unrelated to the specified research axis, may lead to the dismissing of a project. Once again this is a safeguard intended to ensure that research and scientific agenda remain central focus of the lab.

Level 3 – Research Axis

Finally, at the top level are the research axes representative of the interests of all full members of the lab. These research axes are conceptual umbrellas intended to conceptually frame the relationship between social innovation initiatives and their corresponding research project. A research axis provides an effective way to think about i) intertwining social innovation initiatives and research projects, ii) pursuing heuristic objectives, iii) engaging academics that are not familiar with research through project based methodologies.

3.2 Safeguard ensuring the integrity of research activities

The objectives of such an organizational model are threefold. First, research and dissemination standards serve as a safeguard ensuring that the university doesn't become an unfair competitor to consultant agen-

cies. In an emerging field such as social innovation there is a risk that university with faculty on payroll and graduate trainee cannibalize the emergent field of social innovation and prevent the rise of a sustainable "market." We believe that academics are legitimate when they engage in social innovation initiatives for they have a role to play in expanding the horizon of design activities. As argued by Tonkinwise (2016) "the *Idea* of the *University* is that they should always be going against what the market is doing. The job of the *University* is to think about things the market cannot" (4:37–4:52). Moreover, we also believe that academics have the responsibility to train students by providing them experiential learning in the field with real community benefactors.

Secondly, this three-level structure is envisioned as a way to foster collaboration and help bring together researchers' activities. It is intended to facilitate partnerships and mitigate terminology differences that often accompany cross-disciplinary teams while ensuring that the lab remains a living environment capable of adapting to its members' evolving objects of concern. We are cognizant of the fact that contemporary issues are complex and multifaceted; they give rise to new concerns and that some opportunities will present themselves organically. As we remain open to such possibilities, a new research axis can develop while the established ones may transform or be completely abandoned. The safeguards are not intended to lock things up. They are there to facilitate dialogue among researchers, community partners and within and beyond academia.

Finally, and most importantly, we consider this structure to be an effective way to create a setting that enables scholars, especially those from outside the field of design, to find an intelligible research space that is also a convenient setting for them to advance their research activities and ultimately their scholarship. Therefore, we believe that embracing research through project-based initiatives this lab structure will cultivate fertile land for unique, cross-disciplinary exchange and foster the emergent of genuine interdisciplinary dialogue for real and sustained social innovation.

4. Reconciling the grammars of project and research

The research axes as conceptual lenses are intended to lay the ground for effective coordination among researchers from different intellectual cultures around the research questions and social innovation initiative.

We consider the umbrellas as positive factors capable of bridging gaps in language and terminology between the kind of research done by designers with the scientific paradigm more common in academia.

Our lab will first be structured around three axes: 1) ethics, 2) epistemology of design practice, 3) socio-politics of design. Project-based works set around the Ethics axis will focus on the moral responsibilities that come tangentially to all social innovation initiatives. This axis is also closely bound to the issue of training designers capable of sustaining those moral responsibilities. The Epistemology of Design Practice axis is intended to frame reflection from a metacognitive standpoint (i.e., how do we know what we know) and analyze projects to a better access and understand a designerly way of thinking and doing (Cross, 2007) in projects aimed toward social innovation. Finally, the Sociopolitical axis will consolidate research projects focusing on the analysis of social innovation and the longitudinal and intrinsic value these types of design activities have.

As conceptual umbrellas, the research axes have trickle down effects to frame the research projects and social innovation initiatives. On the other side, the social innovation initiatives give rise to first-hand information fed from the research activities.

Conclusion

While it can be debated whether or not design research should play by the rules of academia and scientific research, we have to live by them for the time being. Both promotion and tenure committee and research funding from Federal Agencies have a word on setting the standards by which contemporary scholarly activities are evaluated. The challenges remain: *is it possible to play by those rules and still be capable of engaging in research through design projects?*

In this paper, we discussed the ongoing project of establishing of design-driven social innovation lab in the Design Department at The Ohio State University. We presented the specificity of a Tier 1 Research intensive university and the roadblocks that such a context presents for design research. We posited that for research through design to happen and be valued for what it is, there is need to organize activities in ways more fitted to current standards of academia. On that matter, we presented the organizational model (an action framework) we envision to structure our lab activities. We demonstrated how we intend to “protect” the scientific

agenda by setting certain safeguards. Moreover, we argued that our three-level model provides the sort of grammatical structure capable of bridging the gap between design-driven research and academia. In other words, the framework provides a mechanism for a shared language to emerge and enables social innovation initiatives to become not only an object of study but also a genuine context to study.

Sébastien Proulx
Associate professor,
Department of Design,
The Ohio State University,
proulx.12@osu.edu

Susan Melsop
Associate professor,
Department of Design,
The Ohio State University,
melsop.2@osu.edu

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Interact Global Design Networks

Exploring Post-Disciplinary Design in a Global Context

Tobias Revell, Eva Verhoeven

Abstract

Interact is an academic and student exchange project between four major institutions that explores the futures of design in the global context.

The first stage of the project took place between 2014 and 2017 across London College of Communication, University of the Arts (London), Danish School of Media and Journalism (Aarhus), Royal Melbourne Institute of Technology (Melbourne) and Queensland University of Technology (Brisbane), the project draws on the abundance of knowledge and experience of interaction design in practice, research and pedagogy between the institutions and industry partners to develop new ways of collaborating and communicating across institutional, national and expertise borders.

The project affords for a diverse range of voices across countries, fields and levels of expertise to develop strategies for applying interaction design to combat anxiety about future uncertainty, imagining and building new opportunities. By encouraging a global vision for staff and students in the program the project aims to broaden vocabularies and carve out a shared language for design and its interlocutors. This language works in a future-facing way; able to tackle or at least reconcile anxieties in regard to the dramatically shifting geopolitical contexts that design is bound up in.

The significance of the project lies in imagining alternative futures of interaction design practice and research against the tendencies of contemporary geopolitics. The vision of Interact affords space and time for a global forum of students, academics and practitioners with interaction design as a universal language of practice. The project established and provided frameworks for new pedagogic and practice relationships between academics, students and industry that would allow for continued resilience through collaboration and sharing.

The first stage of the project concluded with a seminar at the London Design Festival in September where many of those involved were drawn together to develop outputs and begin next stages. Here we were able to deal in strategies that would enable the continuation of a global, anti-nationalistic design practice. We drew conclusions about the vitality of these kinds of ambitious international projects, their importance to the continued imagination, ambition and growth of design fields and their role in combatting anxiety about future uncertainty.

Theme: Language
Keywords: collaboration, internationalisation, education, digital, resilience

1. Introduction

Interact (full title: INTERACTive Studios & Innovative Networks for Future Design Careers) was a three-and-a-half-year student and staff exchange between four higher education institutes in the EU and Australia. In Europe, the London College of Communication (LCC), University of the Arts London and the Danish School of Media and Journalism in Aarhus, Denmark. In Australia, the Royal Melbourne Institute of Technology (RMIT) and the Queensland University of Technology (QUT) in Brisbane. Between 2014 and 2017 forty student and twenty staff exchanges were made between the European and Australian institutions. The project focussed specifically on undergraduate level designers in the field of what could broadly be termed 'interactive design'. The key courses and programs involves were BA (Hons.) Interaction Design Arts at LCC, Bachelor of Visual Communication (Interactive Design) at DMJX, Bachelor of Design (Communication Design) at RMIT and Bachelor of Design (Interactive and Visual Design) at QUT. Throughout the period of the exchanges students would typically spend one unit (approximately ten weeks) at their exchange institution and receive transferrable credits while staff would typically exchange for one to two weeks in order to observe classes, deliver sessions and hold operational meetings.

The objectives of the Interact program are clearly laid out on the program's website:

> "The overarching objective of the INTERACT programme is to link coursework, studio practice and work integrated learning (in a cross-cultural setting) to develop better graduate outcomes for future practitioners in the field of Interaction Design." (Interact Mobility Network, 2018)

In the current global context of growing anti-globalism and anti-intellectualism as well as changing work and living patterns, the needs of industry and students, Interact was an experiment to see if a common language of design could be used as a platform for the resilience of the field and student experience of design.

Interact is a unique project as far as the authors are aware in its scale, scope and ambition. Being a global exchange of a large number of individuals for lengthy periods it stands out as almost an institution in its own right. There is valuable work to be done in sharing operational methods for how projects like this are set up, structured and run. However, the aim of this paper is not to focus on the operational proceedings so much as to illuminate the disciplinary, pedagogic and institutional lessons of it and how they enable and are enabled by the vitality of design as a common language and common languages within and across design.

This paper will firstly summarise the key questions and concerns of the Interact program as it stands three years in and towards the end of the program; the questions of context, discipline and pedagogy. Secondly, we will examine and critique the methods of enquiry we used between the institutions including the students and staff exchanges and other events. Thirdly we will examine key lessons in disciplinarity, pedagogy and politics. We will then introduce and discuss the next steps of the project and the rationale behind them before concluding with key lessons and strategies for programs like Interact.

2. Key Concerns and Questions

2.1 Global and Political Context for Design

Primarily, the Interact program seeks to address and question current assumptions in higher education institutes about discipline and pedagogy in design. To do this the program embraces and experiments in the changing global context of the designer and the design student. The specific concerns can be listed as:

1. Globalisation and atomisation of design processes in industry.
2. Changing working patterns and employment structures.
3. The growth of tools for digital collaboration.

All of these are found in a political climate specific to Europe and Australia of increasing conservatism with regards to intellectuality and human migration which directly affect the subject area.

As an international exchange the project attempted to inculcate the concept of global design practice, a concept that is all but the norm for the contemporary designer:

> "In today's global economy, multinational companies and worldwide supply networks mean that participating in distributed working has become commonplace for many engineering designers." (Wodehouse, A., et al, 2008)

By operational necessity, the contemporary delivery of design education generally places it in one city and institutional context. This offers little insight into the lived experience of design practice where practitioners move between tasks, groups and places both physically and digitally at regular intervals.

The Interact program sought to explore ways of operationally and theoretically integrating a global-first approach to learning and practice in the students, situating them in their learning primarily as global practitioners as opposed to students based in a particular city. Operating this way requires a set of skills not necessarily delivered in the day-to-day running of a course or program. Students need to be adaptable, quick and confident in their interactions as well as competent in organisation and self-direction. These are qualities that we would expect to instil in all students but is hard to embed in praxis when in a purely localised context. These ambitions introduce an element of pastoral education into a design curricula that may not necessarily be present when a routine of sedentary education and practice is considered the norm.

Tied to the globalisation of design is the issue of employment and labour structures. Again, the nature of an institution is to offer sustainability, stability and routine which reflects little of the agile, adaptable and uncertain working habits of the contemporary designer where work is increasingly "...intermittent, irregular and informal and tend[s] not to be based on contractual agreements." (Shorthouse & Strange, 2004, p. 45) By emphasising the skills of self-organisation listed above, the aim was to experiment in embedding attitudes and strategies of resilience into the operation of the program and delivered curricula.

Finally, the growth of digital tools for collaboration are enabled by and enable globalised design practice and more precarious working habits. The aim here was to experiment with platforms and services that would allow for the program to be delivered in a similar way.

2.2 The Discipline of Design

The fraught question of disciplinarity in design is an ongoing issue which the Interact program sought to at least acknowledge if not address. This problem is approached through three main lenses:

1. Transdisciplinarity in design.
2. What a designer is in view of the global context described above.
3. The relationship with practice outside of the academy.

The academic teams and the course materials involved with Interact consistently refer to the value of transdisciplinary languages in the toolkit of the contemporary designer. The Interact material describes a "...transdisciplinary field of design practice..." (Interact Mobility Network, 2018) as its remit. It's largely accepted that the future of design practice and the designer will involve high degrees of agility in interacting with other design fields as it becomes "...an all-encompassing field that integrates together business and engineering, the social sciences and the arts." (Norman, D., & Klemmer, S., 2014)

Although it is largely accepted, it is harder to practice and deliver truly transdisciplinary curricula in the context of large HEI's where the "hidden curriculum" (Dutton, 1987) can often take precedence and stifle the flow of skills and information necessary for true transdisciplinary.

In order to operate in a transdisciplinary way, it is first vital to understand the discipline we are situated in. By working across the globe and with a vast range of individuals, skills and courses, an aim of Interact is to establish commonalities that can form a language of design. The shifting nature of design practice as it becomes globalised and brought into a huge range of applied practices makes it harder to pin down definitions for practice and discipline. As Paul Rodgers and Craig Bremner note:

> "...design is expanding its disciplinary, conceptual, theoretical, and methodological frameworks to encompass ever-wider disciplines, activities and practice. As a result, design is either copious and being smeared as a viscous layer over the problems of the world, or what we call design is being stretched into an impermeable film expanding to keep in capital and consumption." (Rodgers, A.P., & Bremner, C., 2016)

Reviewing the titles of the courses and programs involved in the exchange as outlined in the introduction it's easy to see why the loosest possible definition of interaction design was applied as a disciplinary remit for the activities of the program. Even in this loose framing, it is an ambition of the program to see if students from different global contexts could establish a common language within their own understanding of the discipline that allowed for agile, confident and easy transition to new contexts in keeping with the shifting nature of practice.

Questioning the discipline and hence what a future designer is and needs to be relates to the relationship of teaching with industry. Interact was set up with the support and consultation of fourteen major industry partners and students took part in work experience as part of their exchange. The subject of the direction of the relationship with industry and teaching is much larger than can be covered here by the authors. The creeping perception that '...higher-education institutions that largely operate at a 19th-century pace [are] trying to keep up with the fast-changing demands of 21st-century employers..." (Marcus, 2017) was sought to be challenged by an approach in Interact that seeks to "...build the capacity that is necessary to answer current and future market needs." (Interact Mobility Network, 2018)

2.3 New Pedagogy

Finally, in respect of the shifting global context and disciplinary debates the project sought to discover new teaching strategies and methods as well as gaps in the current teaching offering in the partner institutions:

1. How we can work beyond and between institutions and what we can learn from each other?
2. What digital platforms and new shared productivity tools can be integrated in learning?
3. Where in the new globalised context of the design discipline do we need to change teaching?

As noted in the previous two sections the changing nature of the designer leads to changes in the disciplinary definition of design which in turn demands new pedagogies and teaching and learning strategies. As an outcome the emphasis here was on exploring how teaching at partner institutions could change in response to best practices between the partners.

Firstly, we sought to have conversations between teaching staff at different institutions in order to share and learn new teaching methods from each other. This is a relatively straightforward exchange of expertise which will be explored in a later section. A more complex ambition for the program was to open the institutions to sharing of teaching responsibilities – an inter-institutional program of learning rather than one situated at any particular institute. Several external events beyond the main student exchanges sought to push this idea further.

Secondly, by the sheer nature of the geography of the institutions involved, the use of digital tools was a crucial factor in the way that teaching was delivered and the program recorded. Interact sought to explore ways of integrating digital tools like real-time collaborative platforms which are standard in many industry and practice settings.

Finally, was the more existential question of how teaching needed to shift in response to the lived experience of the contemporary designer. This need has been well noted in the previous two subsections but questions about how to 'teach' resilience, organisation and prepare students for precariarity and global practice were a key ambition of the program.

3. Modes of Enquiry

The program could be said to have three main modes of enquiry with regard to the ambitions listed above: student exchange, staff exchange and a series of one-off events associated with the program. In each of these modes, feedback in the form of interviews has been gathered both at the point of the exchange or event and in retrospect toward the end of the project. This section will briefly describe and critique the various methods used to explore the ambitions of the program.

The main work of the program was in the exchange of forty students between the EU and Australia over three years. These exchanges typically lasted for a 'unit' – around ten weeks. Much exhaustive work was done on the writing of credit exchange frameworks and delivery methods to make sure that students could use their exchange in their own assessment criteria at their own institutions. This has since become an incredibly useful exercise in creating precedent for further exchanges of this scale but presented obvious logistical and organisational difficulties at first.

Students were first asked to propose a rationale for exchange before being selected by their own tutors. The objective was to match each student to the institution of their best interest and as an iterative process of

exchanges, a greater understanding of the strengths and weaknesses between each institution was learned over time. By placing students in other cohorts in other institutions they had to respond and to adapt to new intellectual and structural ways of operating.

Students additionally took part in work experience as part of their exchange. This was often unsuccessful for operational reasons discussed in the next section.

Throughout their exchange and after, students and staff worked with various digital tools and platforms to maintain contact and share work. There is an active Google+ group, an edited Wordpress site with regular updates and then productivity platforms like Slack and Trello are used to organise tasks and schedules. These platforms are industry-standard and offer students insight into the collaborative behaviour of contemporary designers.

The student exchanges were unusual for the partner institutions in their length and expense and volume. In other words, for most of the universities it was the first time that something of this scale had been undertaken. This became a debugging process for how to do exchanges on this scale in the future. The initial round of exchanges suffered from issues – connecting international offices to housing to legal departments to make sure that visas, accommodation and academic process are all aligned. Academically, though a student exchange is an invaluable form of learning about the operation and methods of other organisations and conceptions of design it is necessarily limiting – only a handful of students (relatively) are able to take part and this privileges these students above others in their domestic and international cohort. As the academic team we also made sure to interview the students at various points throughout the process to keep track of their changing attitudes and feelings towards their experience. The student exchange alone only offers one perspective – from the praxis of being a learning designer. Inevitably students lack much experience outside of university education that gives them a sense of how their learning connects to the 'world' of design through the strategic decisions of academics and course teams as well as the pursuit of projects. In order to complement the 'ground-level' perspective of students it was important to engage in work experience as well as conduct staff exchange for a more 'birds-eye' view.

Staff exchange typically lasted one to two weeks between the EU and Australia. During exchanges staff would conduct classes, take part in crits, run workshops and deliver lectures as well as socialise with other

institution's staff and students as a way of strengthening partnerships. This staff exchange has developed into several one-off projects described below but one of the tangible outcomes is a 'recipe' book of pre-prepared workshops and sessions that was gathered through google forms and shared between the staff at institutions. This also served as a way of sign-posting key disciplinary approaches and styles that were common across the institutions. As mentioned above, the staff exchanges complemented the student exchanges and ensuring that there was dialogue at key points between the various staff and students involved kept perspectives mixed and rich. The staff exchange runs the same problem as the student exchange in privileging the experience of those taking part and toward the end of the project, the intention of broadening the mobility exchanges to a wide range of staff at the partner institutions had in fact narrowed to a handful of core staff associated with Interact. This was largely due to the shifting priorities and staff teams at the partner institutions, which made sustaining leadership and participation in a project lasting around five years from preparation to execution difficult. Towards the end of the project when conducting closing interviews, many participating staff had in fact left the institution they were at with Interact and had to be tracked down elsewhere.

Finally, several events and one-off projects took place that are of particular note. Firstly, an online workshop delivered by staff of DMJX to RMIT students in real-time. This was a pre-emptive experiment in digital collaboration and inter-institutional teaching delivery. Secondly was a seminar at the London Design Festival hosted by LCC where members of the program and student alumni attended to discuss the outcomes from the program and next steps. Much of that discussion has informed this paper. Further to that we are working on a 'Global Design Studio', an attempt at a collaborative teaching unit to be delivered simultaneously at the partner institutions using digital tools to create opportunities for student collaboration across the institutions. These events provided an opportunity to explore intellectual and practice ideas but also to cement the social and cultural identity of Interact with recurring personalities and practices. They provided an iterative opportunity for the program to continue to grow and develop.

4. What was Learnt

4.1 Lessons on Pedagogy

An outright aim of the program was to refresh teaching methods and focus at the partner institutions. As Neal Haslam at RMIT noted in an interview "We teach in a changing way, design teaching has to change. If it's not changing, it's dying, it becomes a legacy. So Interact exchange has provided us that opportunity explicitly to keep the conversation going."

The first clear lesson to draw on teaching is the models in which content is delivered between the EU and Australia. Both LCC and DMJX lean heavily on atelier-style groups. This model is familiar all across Europe and encourages a student-driven, deep and engaged approached to the intentional material being delivered or the design brief set. By having an open fluid space and a multi-year relationship with peers and tutors, students feel confident in synthesising a range of theories into bold experiments and original outcomes (Crowther, 2013). Students are more empowered to take more ambitious and riskier design challenges by the set of social relations they have constructed and learning is delivered on a more personal level, the tutorial being central, but impromptu collaboration and personally-driven external projects also forming an important part of expanded practice. One RMIT exchange student commented: "The studio environment was instantaneously welcoming from both the staff and peers, resulting in an easy progression into the experience and since has been a supportive atmosphere to work in." (Interact Mobility Network, 2018)

At a contrast, RMIT and QUT, with a history as technical universities are taught with a modular structure. The common social culture of the studio is dispersed across a series of modules delivered by specialist tutors for a few hours a week. In these classroom, without the confidence of long and established relationships with peers and tutors, students can often find it harder to being confident in criticality and experimentation with design.

However, where the atelier model provides opportunity for social integration and confidence, it is limited to that group. We discovered over the exchange that the students with the most pastoral problems were ones from LCC going into an unfamiliar environment of another institution without the confidence and independence to adapt and be opportunistic that the modular learning environment of the Australian universities instilled in their domestic students.

The problem of delivering the values of resilience and globalness that were the aim of the program was harder. Through the very nature of exchange, being thrust into a new environment with a new support structure, the students on exchange were forced to adapt quickly and move fluidly into their new setting but this is not necessarily something that is 'taught' as part of the student-tutor relationship. A point that returned in interviews with teaching staff was the way that having an exchange student changed the dynamic of the rest of a group they were put into – it opened new conversations and worked to broaden the contexts of discourse in a group. One example brought up by Deb Polson at QUT was a debate in class on the relationship between 'responsibility,' 'ethics,' and 'sustainability,' which arose from the different emphasis' and definitions in the European context of her two exchange students and the rest of her cohort. This was a point opened up by other tutors who commented about the effects of an 'internationalisation' of the cohort that came from having students from other institutions offer alternative perspectives and interpretations.

Aside from emergent learning in these kind of in class debates, a heavy emphasis on work experience and industry partnerships was supposed to lead the project and offer educational opportunities. In reality these relationships rarely worked out in the way they were supposed to. Due to a confluence of visa issues, poor communication and the logistics of parsing course structures, terms, blocks and semesters, units, programs, years and courses, credits points and grades only a handful of exchange students engaged in work experience. Unfortunately, this is a failing of the project, and a project like this at any scale that the mismatch in the scale and agility of small, industry-leading companies versus behemoth institutions and national boundaries will always hamper opportunities for exchange between these sectors.

4.2 Lessons on Discipline

The search for a common language that was undertaken by Interact find its roots in trying to use design as a language that can allow students to be resilient and flexible across time and space into their future practices. In doing this, we sought to define 'interaction design' or at least 'design' in some way through the shared practices we saw in exchanges and projects. Although there was never a particular time where the partner institutions sought to lay down a definition of design per se there were defi-

nite agreements about the need for design education to adapt to changing political circumstances.

The changing role of design in the contemporary world probably puts us past definition. Impressing rigid constraints on students who will be forced to adapt and be agile for their careers may prove more destructive than enabling. Rodgers and Bremner note that the work of leading designers and companies "...regularly transcend historical disciplinary frameworks such as interior design, fine art, product design, and graphic design..." such that "...the discipline that was once recognized and acknowledged as design, which was born of the split of idea from manufacture, now has little to do with manufacture and a single idea." (Rodgers, A.P., & Bremner, C., 2016)

Instead design, rather than a discrete discipline in and of itself seems to form the role of a language that works across boundaries of globalisation and techno-politics, using the digital as a medium to build connections that challenge political narratives of borders and disciplines.

A key example of this re-assessing of the nature of the discipline is how students have reacted to seeing the practice and research of design in other institutions. The ability to enter into new conversations and discourses with students and staff from other institutions cements in them the idea that design is a subject that transcends the boundaries of a single institution. As Blair Wilde of RMIT noted in interview "...they've stopped looking at it in context within this particular institution and gone 'ok, there's much bigger context – I can think about things in a different way – there's actually a bigger picture here.'"

At all the partner institutions, there is an ambition to deal with these larger contexts and disciplinary ambiguities by allowing for more flexible and agile forms of practice – RMIT are implementing and testing a 'studio model' where students gather round specific projects with different focuses across year groups. At LCC there is discussion around a similar model of modular flexibility in order to respond quickly to expectations and contemporary disciplinary changes. This can be difficult in large institutions that rely on regularity and legibility but the staff involved have been working to exchange strategies and tactics to get agile and responsive design teaching that can respond to disciplinary discussion into curricula. This exchange of strategies and tactics is endemic of a structural problem at all the partner institutions and more globally – a focus on clustering students around subject rather than necessarily around ideas. While the partner institutions all exchanged students from

some form of design we are increasingly witnessing a prevalence of 'creative' courses that are not necessarily clustered around a certain subject or canon but around a socio-technological concept – Nelly Ben Hayoun's 'University of The Underground' or 'Shadow Channel' – both associated with the Sandberg Institute are interesting examples of 'pop-up' courses that deal with particular contemporary issues rather than a discipline. It's in this mould that the idea of modular, agile studios for students could work.

The pull towards a modular curriculum that is globally active and has internationalisation built into the praxis of the course is the Global Design Studio described in further detail in the conclusion. The Global Design Studio will be an attempt at a modular, agile and digitally-constructed unit/course that allows students some of the experience of exchange without the cost.

5. Conclusion

Interact sought to discover a common language across interaction design (and design more broadly) that would enable future graduates to learn strategies of resilience and empowerment in the changing political, disciplinary and institutional context for design. The partner institutions would use the student and staff exchanges to develop new teaching and learning tools and form lasting partnerships that would strengthen the global design network. As Interact draws to a close, with most commenting on the success of the project we are moving in to new forms of relationships and new projects, discussions and early stages are underway to expand these exchanges to higher levels; postgraduate and research partnerships as well as more programmed teaching exchanges. A more tangible next step is the creation of the Global Design Studio, a project in partnership with designer and educator Fred Deakin and staff from Interact to use digital platforms for a collaborative project involving eighty students from LCC, DMJX, RMIT and QUT. The aim of the Global Design Studio is to introduce working practices of: "... trans-national collaboration in order to enable students to move beyond a focus on local teams and outcomes to global ways of designing together." (Internal document, no source)

The Global Design Studio was the product of attempts to distil the key benefits of Interact into a formula that could be scaled to include a greater number of students without the expense of a physical exchange.

In the Global Design Studio, the students will have to learn to build relationships, share skills, exercise critical judgement and resource management while being asynchronously connected through digital platforms such as Slack and Trello.

There an understanding across the institutions that the way we teach design needs to change and this needs to be done regardless of the pace of the institution's internal clocks or the logistical and operational problems of interfacing effectively with industry. The digital platforms tested out in Interact and going to use in the Global Design Studio indicate an opportunity to work around institutional structures while an increase in emphasis on modularity and teaching structured around contemporary issues rather than traditional disciplinary boundaries prepares students better for a reality of trans-disciplinary practice.

Tobias Revell
Course Leader, MA Interaction Design
Communication School of Design,
London College of Communication,
t.revell@lcc.arts.ac.uk

Eva Verhoeven
Programme Director Interaction Design &
Visual Communication School of Design,
London College of Communication,
e.verhoeven@lcc.arts.ac.uk

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Using shared language ‘tools’ in Curriculum co-design

Job Rutgers, John Fass, Mo Ling Chu

Abstract

The conference track 'Together, the need for a shared language'? poses the question if due to the interdisciplinary nature of their work, designers speak a 'common language'. In this paper, a working group of design schools from Canada and the UK describe how they have taken this question on shared language as the set up for the co-development of curriculum design 'tools'.

Language is usually thought of as means for communication. For the purpose of this conference it is important to note that for designers, it is also a tool. Designers use both written and visual language diagrammatically, to abstract concepts, to reveal and explain patterns, and to simplify complex phenomena to their fundamental essences. In this paper, we intend to share new (shared language based) tools. While these tools share a number of purposes, the overall aim is to better understand, design, manage and communicate the uniqueness of design education.

Firstly, as educators of 'design doing' we sometimes lack the language to explain students what is being learned within the iterative, reflection-in-action cycles that characterizes studio based design education. This is paramount especially now that design is presented (in attractive language) as part of the curricula in business schools and engineering programs. This paper explains our use of the term 'design competency' as a tool to explain and differentiate the unique learning of design.

With design disciplines and territories changing rapidly, the challenge of creating a future proof design curriculum is vexing, as the education system, like a super tanker, is complex to maneuver and slow to change. In this paper, we will share a case study on a recent curriculum co-design activity that aims to illustrate how shared language facilitated by using the Design Competency Futures Matrix tool to collaborate, conceive, compare and adjust design curriculum.

Shared language is also being used as a tool in managing and evaluating the effectiveness of design education. In this paper, we will discuss some of the challenges associated with using design competencies for comprehensive and progressive measurement of students learning in design education, with an eye to future employment. We briefly discuss the creation of more specified job profiles (composed of design competency weightings within the curriculum) as useful new tools bridging the education / job market gap.

One of our longer-term visions is to create a social network tool in which self-directed learning insights are the social capital. In this paper, we will share some current prototyping and explorations with the aim to probe debate and interest.

Lastly, with the rapidly evolving methods, tools, thinking and application of design being reported each year at the Cumulus conferences, we are asking the question whether it would it be possible to extend the notion of shared language across design schools? In this paper, our aim is to initiate a competency design workshop at Cumulus in which participants of the conference discuss, debate the key design competencies that are being elicited within this year's program.

Theme: Language
Keywords: curriculum design, co-creation, future proofing design

1. Introduction: New Tools

In this paper, our explorations on 'using shared language as a tool' are organized around the following themes:

Shared language as a 'platform' for curriculum co-design: With design disciplines and territories changing rapidly, the challenge of creating a future proof design curriculum is vexing, as the education system, like a super tanker, is complex to maneuver and slow to change. In addition, while diversity of educator's professional design vocabularies is an asset for rich learning environments, it also causes a Babylonian confusion when designing curriculum. How can we enable design educators to co-design curriculum based upon shared language? In this paper, we will share a case study on a recent curriculum co-design activity that aims to illustrate how shared language can be beneficial.

A tool to communicate the value of design education: As educators of 'design doing' we sometimes lack the language to explain students what competencies are being developed within the iterative, reflection-in-action cycles that characterizes studio based design education. As educators, we are obliged to our students to be able to tell them – in clear and unambiguous language – not only what they will be able to do in the future, but also the unique value of what it is that they learn. This is paramount especially now that design is presented (in attractive language) as part of the curricula in business schools and engineering programs.

A tool to manage and evaluate design learning: Shared language and clarification of learning outcomes are also critical in managing and evaluating the effectiveness of design education. The quote "If you can't measure it, you can't improve it") holds true for design education. Yet the current available assessment tools and metrics in North American Design Schools are mostly derived from traditional academic learning environments. These in turn are characterized by knowledge acquisition through text, seminar rooms and writing. However, design students generate a different type of knowledge that is manifested in a wide range of visual output, from sketches, presentations and diagrams to physical experiments with models, materials and colors to digital renderings and specifications in 2D, 3D and 4D. For an experiential learning environments, if we cannot measure, track and evaluate the design competencies that are situated within iterative and reflective processes of making, we may endanger the so valuable tradition of learning by doing. In this paper, we will discuss some of the challenges associated with using design competencies as a method of measuring design education.

Shared language as a medium for social learning: One of our longer-term visions is to create a social network tool in which self-directed learning insights are the social capital. We do not aim to replace the rich, sensorial and social nature of the classroom but aim to enhance the online educational environment through a design based social medium. The foundation of such social learning platforms is based on the establishment of a shared vocabulary between students themselves. In this paper, we will share some current prototyping and explorations with the aim to probe debate and interest.

A tool to express new developments in design education: With the continuously evolving discourse on design (methods, tools, thinking and application of design) reported each year at Cumulus conferences, we are asking the question whether it would it be possible to extend the notion of shared language – across design schools – through the establishment of a 'living' design competencies lexicon for design educators? In this paper, our aim is to initiate a competency design workshop at Cumulus in which participants of the conference discuss, debate the key design competencies that are being elicited within this year's program.

2. The value of design education

The increasing attention on design and design education within both academia and business environments (Martin, 2007) warrants a more introspective attitude toward what exactly is being acquired by designers through design pedagogy. While leaders in business schools and design scholars are very skilled in articulating the benefits of design and design thinking in language, there is less attention to how these so desired designerly ways of thinking (Cross, 2010) are actually acquired in practice.

It is our assumption that the humble, everyday context of being engaged in a process of making provides the fertile ground for higher level cognitive learning capacities that are critical in acquiring competency in creativity and innovation. However, we lack the language and argumentation to properly explain the richness of the learning environment that is required. Further, most designerly thinking is acquired in the process of making, doing and reflecting; and it is this reflection in action cycle, as articulated by Donald Schon (1983) which is most valuable.

As designers, we know that this act of design is a closely interwoven mix of thinking, doing, and feeling. In our educational practice, when we explain to new students what design is and how they can learn it, we stress that professional designers use their hands, heads, and hearts. You need to learn to make things by using your hands and you need to feel what you are doing.

This hands on, engaged heart process ignites thinking and reflection capacity. While this may sound obvious to design practitioners, most regular universities place strong emphasis only on the knowledge side of things – the cognitive domain. In our view, this privileging of the cognitive domain alone is one of the shortcomings of traditional university education. Design education is unique in that it connects learning in thinking, doing, and feeling right from the beginning of a student's education. We frame this connected, integrated and sensorial learning as competency in design.

To elaborate, Ennis (2008) defines a competency as 'the capability of applying or using knowledge, skills, abilities, behaviors, and personal characteristics to successfully perform critical work tasks'. This definition incorporates how we have understood competencies in the Design Competency Futures Matrix as more than technical ability or mastery of domain knowledge. Personal characteristics for example include cognitive, social and emotional attributes deployed by designers in the production of their work. We emphasize competencies beyond traditional studio design skills.

To illustrate how Design Competencies interplay at any given moment throughout a students' education, the example below describes a moment in the project of one of our fourth-year Industrial Design students designing furniture for a palliative care environment. The picture presents the student laying on a table. She is role-playing in order to empathize with being a palliative care patient. She tries to imagine what it is to be lying on a bed knowing he or she will die in. While she is engaged in this immersion activity, she is sketching different functions patients and caregivers would need the furniture to fulfill. Previously, she has reviewed the available literature and spoken to a series of health-care practitioners; now, in the moment captured by the camera, she is identifying requirements for her project. Within the example presented above, the student is applying three Design Competencies at the very moment of doing the exercise:

- *Understanding people:* The student is able to use qualitative design research methods to iteratively evaluate design results). She can reframe her own project based on emerging user insights and is able to iteratively engage with users in all stages of the design process.
- *Visual Thinking:* The Student can fluently use drawings, diagrams, thumbnails, charts to understand the world around her and is able

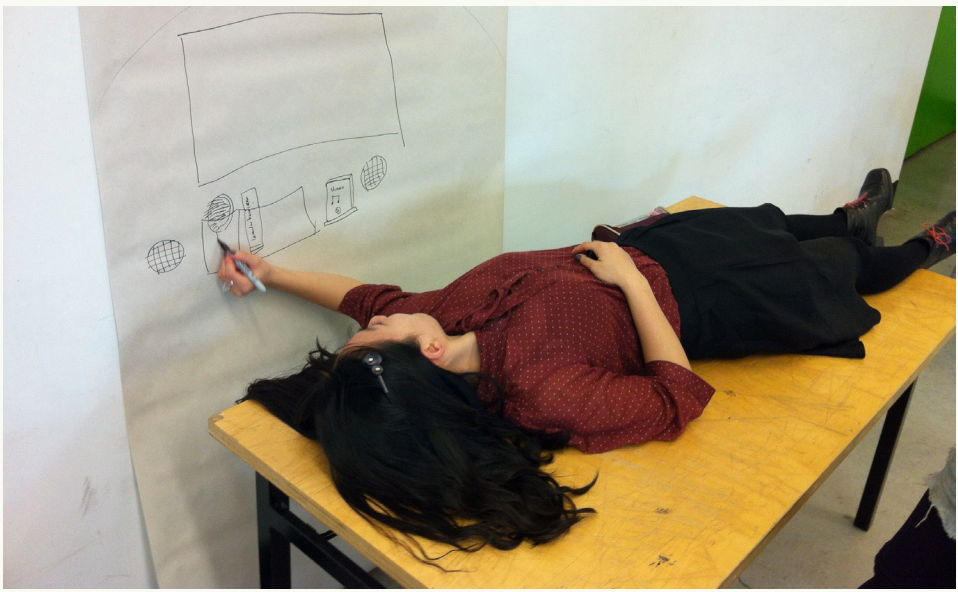


Figure 1: Fourth Year Industrial Design student role playing in order to elicit design requirements for furniture in a palliative care environment.

to visually analyse, conceptualize and articulate product requirements, processes and interactions. She is able to use this competency individually, collaborative and in sessions with her clients.
- *Form Development:* The Student can develop meaningful and aesthetic form solutions. She develops her own voice in form development while working within the constraints of structure, context and materials and apply role of semiotics within the development of a project.

3. Curriculum co-design

Using the definition of 'design competencies' as foundation, our research investigates on how this language can be used by educators to jointly design and develop new courses. Although our research is preliminary, the methodology of using the Design Competency Futures Matrix Workshop has yielded some encouraging results. This section reports on the process of designing a competency-based curriculum in higher design education in Toronto, Canada.

We present the results of a faculty workshop that aimed to envision what a new BA program in design and business could look like. Fifteen participants were drawn from the university, potential partners, and external groups. Participants were consciously included to reflect the range of experience and opinion in the relevant departments.

The methods used included visual annotation of the Design Competency Futures matrix, group discussion, diagramming and card sorting. In the initial task three groups of faculty members were asked to identify competencies for three different student personas using card sorting and personas. Personas are considered to be aggregated individual profiles, derived from prior research. They are used in design as a way of representing different user types and have been extensively deployed in human centered design and interaction design (Getto and Amant, 2015; Kunur at el., 2016). Personas were divided into social entrepreneurs, business startups, and design project managers (Figure 2). These were developed to reflect the range of applications, and the stated interests of potential applicants.

The next step involved brainstorming the potential competencies of the student personas. Participants started by first card sorting, then adding and rephrasing their own ideas prior to arranging them on a table visible to their particular persona group. Next it was necessary to categorize



Figure 2: Persona Profiles as utilized in the DCF Workshop

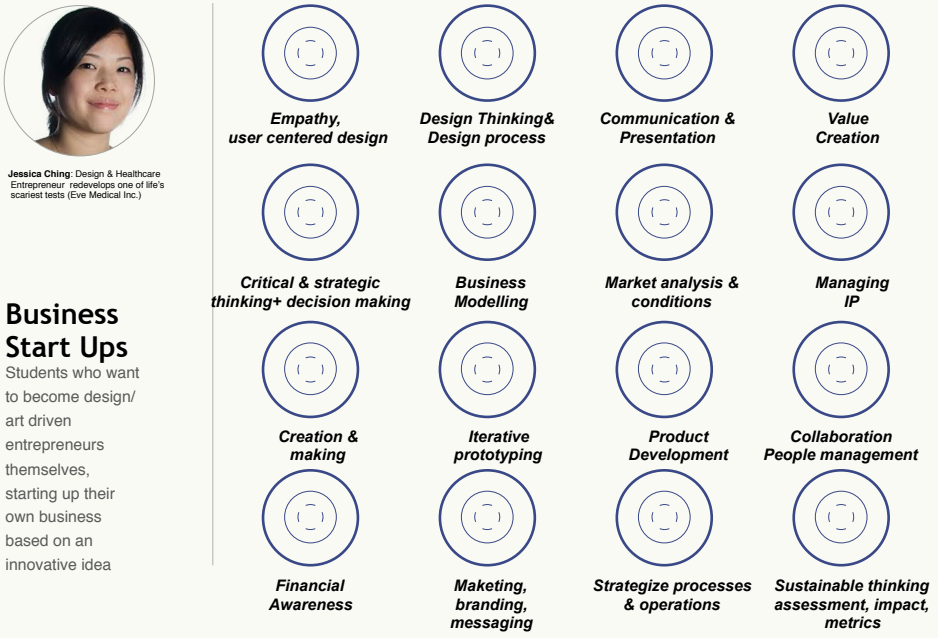


Figure 3: Persona one competency matrix

those competencies and map them to the DCF matrix. The matrix is limited to sixteen separate competencies, this number was chosen as we have consistently found it to enable sufficient detail in the curriculum without over-specifying a program of study. In this way at the end of the first phase of the workshop participants had created three detailed competency matrices, one each for the three personas (Figure 3 Presents an example).

The next step in this phase was to integrate the three separate matrices that arose from the individual student's personas into a single compe-

tency matrix (Figure 4). This was done by identifying competencies common across the three matrices. The aim here was to derive a comprehensive set of competencies around which to build a curriculum.

Phase two of the workshop required participants to follow a similar exercise related to their respective personas but this time to focus on meta-competencies. Meta competencies are defined as those that involve students learning at a higher level of abstraction. They are the most valuable, long lasting and future-proof competencies that students acquire, but also, the hardest to measure and codify, and therefore difficult to implement at curriculum level. For the new design and business degree meta-competencies include; creative confidence, intrinsic motivation and managing complexity (Figure 5).

The final phase of the workshop involved all participants working together to identify pedagogical assets across the different institutions and beyond (Figure 6). This meant accounting for the complementary priorities of project partners and how they might unfold over time in the context of a series of learning encounters and varied learning experiences. An important finding here is that visual mapping enables points of overlap to emerge and corresponding opportunities for collaboration and specialization to be mapped to overall aims of the university and the

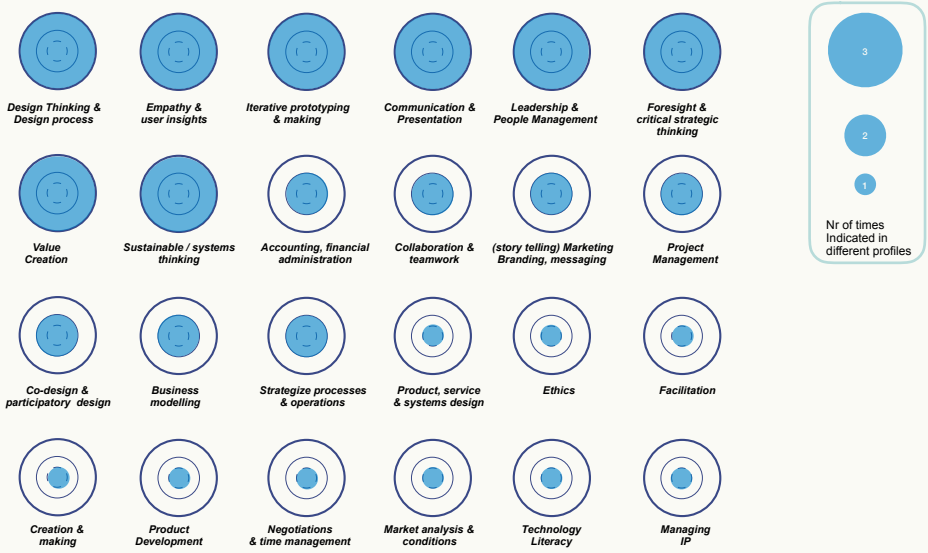


Figure 4: Integrated the three separate matrices that arose from the individual student's personas into a single competency matrix of the new program

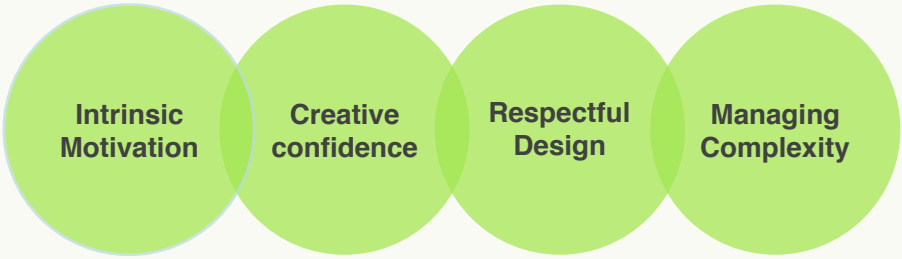


Figure 6: Charting pedagogical assets across the different institutions and beyond

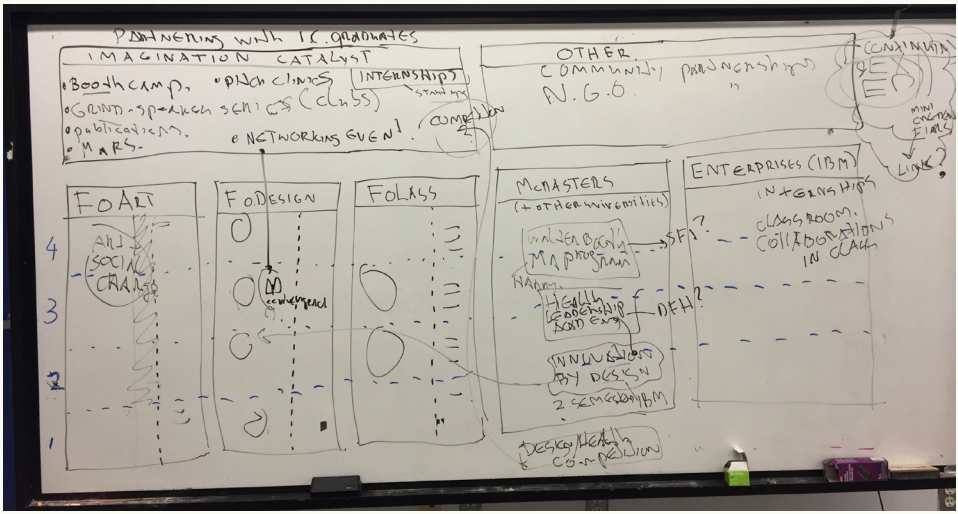


Figure 5: Meta-competencies identified for the new design and business degree

The DCF was shown to support collaborative working in groups from four members up to fifteen by scaling to different levels i.e. from a single competency card to a fully specified matrix. Working together and sharing the results of the group work was shown in the workshop to be enhanced by the way the DCF allowed participants to input their contributions, and how it allowed for plenary sharing.

4. Manage and evaluate design learning

There has been much discussion across Canada on the skills gap/mis-match between postsecondary educational training and labor force needs (Stuckey & Munro, 2013). Opinions vary widely on the extent of these

apparent problems, from those who link the skills gap with a risk to our future economic prosperity to those who question whether these problems exist at all. Regardless of where one falls on this spectrum, the public perception is such that students are increasingly aware of the need to focus on future employability as an outcome of investment in education.

Through our research on design education's bridging to design industry (Kim & Rutgers, 2016; Rutgers et. al., 2015) we understand that one of the key competencies appreciated by employers is that design student need to become able to learn on-the-job and on the go. Being a 'self-directed learner' is one of the most important attributes being a professional designer, and critical in acquiring the critical 21st century competencies (e.g., critical thinking, communication, collaboration, creativity, innovation) (Ontario Ministry of Education, 2016). This type of (meta) competencies are acquired in informal learning and collaborative opportunities; however, measuring this skill acquisition is poorly understood in the context of learning environments and need to be concretized in learners to fulfil this value proposition.

While design (meta) competencies are acquired in informal, hands on and collaborative learning environments, their measurement and evaluation is not served well with current assessment tools that do not acknowledge the embedded, situated and entangled nature of design learning.

Current available assessment tools and metrics in North American Design Schools are derived from traditional academic learning environments, and these environments are characterized by means of knowledge acquisition through text, seminar rooms and writing. Yet design and engineering students generate a different type of knowledge that is manifested in a wide range of visual output, from sketches, presentations and diagrams to physical experiments with models, materials and colors to digital renderings and specifications in 2D, 3D and 4D.

Aligning the curriculum development of an Industrial Design program with the university's Institutional Quality Assurance Plan, we have used the Design Competency Future Matrix as the foundation to chart each of these competencies along a maturity pathways, that are woven throughout all of the different courses in the four-year program.

The University is currently exploring "proficiency-based transcripts that show student learning as academic currency" (Johnstone, 2010). Proficiency-focused transcripts highlight specialized skills and knowledge gained through both formal and informal education, and can be dis-

played via avenues such as co-curricular records, professional portfolios and sites like LinkedIn. The use of proficiency-based transcripts as a mechanism by which tacit learning assumptions are rendered explicit for students is an important avenue for research and development. Developing and validating the Design Competency Future Matrix in collaboration with an eye to future employment, the creation of more specified job profiles (composed of design competency weightings within the curriculum) are possible tools we can utilize in bridging the education / job market gap.

5. A medium for social learning

In all stages of the design process, design students generate a wide range of visual output, from sketches, presentations and diagrams to physical experiments with models, materials and colors to digital renderings and specifications in 2D, 3D and 4D. This hands-on type of learning is key in the acquisition of higher level design thinking capabilities that are currently so much in demand within industry and higher education.

Creating a portfolio is a standard part of a design student's education and is an effective tool to move any student in diverse learning environments including aboriginal learning, the crafts and trades, and apprenticeship training (Higher Education Quality Council of Ontario, 2016), toward becoming a 'self-directed learner'.

While existing on-line design portfolios (E.g. Behance, Format) are helpful in showcasing and sharing final design work, they do not allow students (or designers) to document and share the design process of how they developed their work. Yet it is this process which provides the deepest and most meaningful opportunities for self-learning. We are interested in investigating how to make the students' design process accessible and shareable in an inclusive on-line environment.

Our vision is to create a social network tool (a learning process variant of Facebook) in which self-directed learning insights are the social capital. We do not aim to replace the rich, sensorial and social nature of the classroom but aim to enhance the online educational environment through a design based social medium. Eventually, the insights and experiences gathered in the social medium may be instrumental in designing and delivering better on-line education modules in general.

Through a pilot study, we have initiated an online, open source assessment tool for sharing and reflecting on students acquisition of design competencies. We have conceived and tested functionality using paper

prototyping techniques (see Figure 7). Most recently, we have implemented some very basic functionality as an early proof of concept test within our design programs.

Figure 8 shows students weekly journaling and documentation of their design progress at our industrial design program. There are a number of probing questions on their progress, prior to inviting them to reflect on their process of learning. Students reflected on their perception of learning in regard to the course learning outcomes (the bar chart).

Much recent research on technology-enhanced learning has shown that the mobility and connectivity of technology enables students to become active participants, not passive receivers in learning activities. This affordance of digital technologies promotes a pedagogical shift from didactic teacher-centered to participatory student-centered learning.

The project aim is to create and study a digital learning community that enables design students to document, reflect on and share their design process learnings through an online, open source assessment tool. The community will allow students to integrate with and link to multi-media resources and applications in order to share, communicate, and reflect upon their work and learning.

The tool aims to increase the students' capacity for meaningful reflection and metacognition in diverse learning environments. This capacity for reflection and metacognition will help students to develop and acquire a mastery of multiple design competencies. This mastery level of design competencies provides the stage for acquiring the so strategic higher-level design thinking skills.

6. Share new developments in design education

Each year Cumulus hosts two major conferences for design educators across the world. Each conference presents a kaleidoscopic overview of the latest in design, design research, new methods of teaching and sharing and so on. The gathered knowledge is distributed through the traditional academic publishing channels by means of publishing the selected papers.

Yet how can we draw more direct implications to 'what design competencies' we need to teach our students across our different environments? Would it be possible to extend the notion of shared language through the establishment of a design competencies lexicon? Our aim is to host a workshop at Cumulus in which participants of the conference discuss, debate the key design competencies being elicited within this year's program.

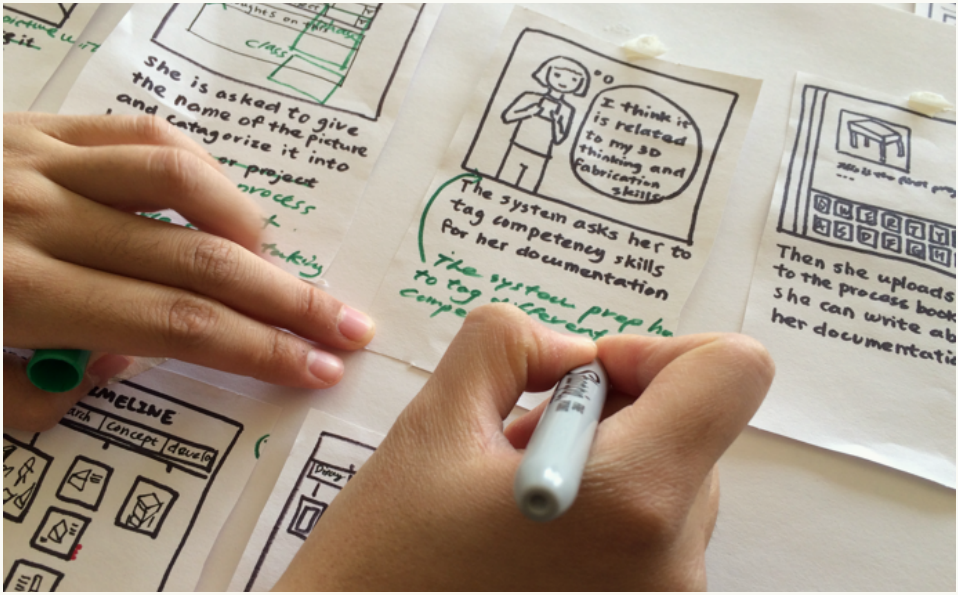


Figure 7: Paper prototyping of social shared language Platform.

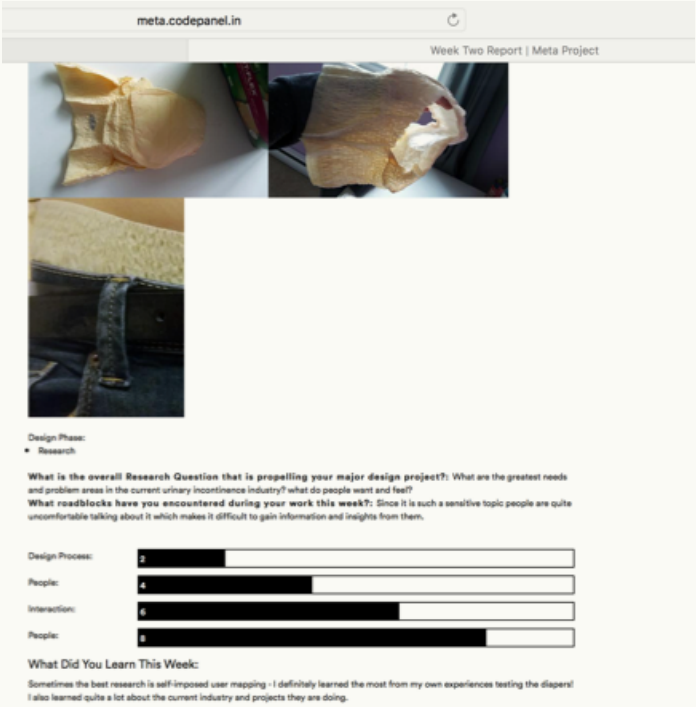


Figure 8: Students weekly journaling and reporting using language Platform.

6.1 Co-creation workshop

We propose to host an open, responsive, curriculum co-creation workshop to share methods and tools that can be used across different design education programs, situations, institutions and cultural contexts. The workshop will also provide a snapshot of current research.

Some of the current inquiries the working group are exploring in terms of curriculum design are: How does having access to shared language affect how students see their own learning development? How can shared language of design be used for more effective learning outcomes assessment? For us, this discussion is about more than just about language, it is about future-proofing the next generations of designers.

6.2 Workshop Process and Outcomes

This workshop will first introduce the thinking and framework we have been working with and quickly become a tangible interactive experience for participants. We will provide practical insights and experiences derived from two recent case studies (undergraduate and graduate design programs in the UK and Canada). Using these cases as context, we will provide participants with hands on experience of the different tools and processes to co-create, disseminate, organize and validate design curriculum. Recognizing the ever-changing nature of design, we will



Figure 9: Workshop participants using the DFC Matrix

conclude the workshop with a call to action: to create an open source Cumulus community that can be used as a shared language repository that helps to organize, communicate, synthesize and disseminate the value of design education.

7. Conclusion

In this paper, we have presented a broad overview of the different tools and processes under development at the Design Competency Futures group. After having established the need for shared language to articulate and differentiate the value of design education by means of 'design competencies' we presented a series of 'tools that are derived from the 'Design Competency Future Matrix'. These tools include co-design formats curriculum formats, tools for monitoring and evaluating design learning, a suggestion for a Design Competency Based social medium and finally a global platform for design educators to organize, evaluate and prioritize learnings from each Cumulus conference in order to translate and transfer these learnings to participating design schools. Moreover, we hope that the overview of experiments with these new tools inspire debate, challenge existing ways of doing and inspire new conversations and partnerships.

Job Rutgers
Professor of Design
Principal Researcher,
OCAD University,
jrutgers@faculty.ocadu.ca

John Fass
London College
of Communication

Mo Lingtaka Chu
London College
of Communication

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II.
TOGETHER, HOW TO FOSTER INNOVATION?

Working in groups, whether intra- or interdisciplinary, is above all recognised for its capacity to unlock the creative potential of everyone, to promote the unpredictable, to diversify approaches and to extend the limits of what is possible. How is interdisciplinarity in the field of design a lever for innovation? Why is design almost always allotted to objectives of innovation? Is there a designated discipline to try to reach this objective? Where is innovation situated, if it exists? Is it a formal, everyday, technical or social innovation?

Exploring collaborative processes between maker laboratories, designers and companies moving from 3rd to 4th industrial revolution

Massimo Bianchini, Venanzio Arquilla, Massimo Menichinelli, Guillermo Gustavo Florez Vazquez

Abstract

The present paper explores the relationship between makerspaces, Fab Labs and other maker laboratories, designers and companies to verify if these subjects are developing collaborative processes and producing a new systemic innovation model in terms of circular economy.

The pioneering stage of the Makers Movement, fostered by techno-evangelists like Chris Anderson and Dale Dougherty (Anderson 2012; Hatch, 2014; Dougherty 2015), is almost over. For more than a decade the impressive growth of maker labs (maker spaces and Fab Labs) has created a hype about their effective role as new production places distinguished by open and peer-to-peer practices. These spaces have multipurpose technologies and multidisciplinary communities (professionals and amateurs) potentially able to materialise almost anything (Gershenfeld, 2005). But today, "anything" means overall materialise experimental prototypes, unique pieces, micro-collection and components that complete products made by other subjects. Economic and technological limits of many maker laboratories (such as basic technologies not easily upgradable because they are undercapitalised) combined with aesthetic, functional and material aspects of artefacts made by makers are still far from being appreciated by the market. In parallel, an increasing number of unemployed or with low wages designers and creative professionals need to transform themselves into self-employees or self-entrepreneurs and are then claiming easier access to the means of production. Finally, SMEs and craftsmen need to digitally transform their products and production processes to intercept a new generation of customers that are evolving into community-market and user innovators (Von Hippel, 2005 and 2016). For these reasons, it can be interesting to investigate if and how these subjects can strategically work together to exceed their limits and develop collaborative production models related to circular economy.

Starting from this assumption, the first part of the paper explores the latest evolution of maker labs, designers and manufacturing companies. A state-of-the-art based on literature review identifies general issues, critical aspects and opportunities about collaborative processes developed by these subjects. The emerging research questions generated a subsequent fieldwork study. The second part shows the results of a study conducted in 2017 on 25 maker labs

located in countries characterised by a high density of these spaces and a consistent presence of designers and manufacturing companies. Sections 1 and 2 of the study describes the maker labs involved analysing their system of relationship with designers and companies. Third and fourth sections analyse the collaborations between maker labs and designers and between maker labs and companies. The last section analyses the projects developed by maker labs involving communities of designers and companies. The whole study aims to reveal if these collaborations can generate sustainable product-services materialised thanks to open and distributed production models. The third and final part analyses the results of the study to define bottlenecks and best practices that inhibit or enable innovation models based on collaboration between makers, designers and companies. The conclusions put these guidelines in the Fourth Industrial Revolution scenario.

Theme: Innovation
Keywords: maker laboratories, designers, manufacturing SMEs, distributed production, collaborative processes, circular economy

1. Collaboration between maker laboratories, designers and companies. A (first) state-of-the-art

1.1 The context

In the last decade, the growth of the Maker Movement and its "maker laboratories" such as Fab Labs, makerspaces, hackerspaces and all other sort of community-based fabrication spaces can be considered as a tangible evidence of a socio-technical transformation process that economists and sociologists have defined "The Great Transformation" (Polanyi, 2001; Brynjolfsson and McAfee, 2014). It is a paradigmatic change, which involves the structure of our productive systems, enabled by a transformation of the nature of work influencing the design and materialisation of product service systems, their market and relation with the human user. In this emerging context, it is plausible to think that figures such as makers or user and free innovators (Von Hippel et al., 2011; Von Hippel, 2016) are examples of a growing process of hybridization between individuals and democratized technologies for design, materialization, communication and distribution of artefacts, also adopting a clear post-humanistic

perspective (Braidotti, 2007). Many scholars chronologically placed makers and maker labs on the most advanced limit of the Third Industrial Revolution (Anderson, 2011 and 2013), two paradigmatic symbols of this age. Makers have been described as independent innovators able to concentrate on a personal-collaborative dimension design skills, scientific-technological skills, entrepreneurial skills, and communication-dissemination skills. Maker labs have been defined as enabling spaces for these new figures, and like other (micro) places such as homes, offices, gardens, they can be considered as atoms or minimal units of a sharing and circular economy model that "will allow people to monetize everything from their empty house to their car." (World Economic Forum, 2016, p.4). Makers can also be viewed as an intergenerational class of independent innovators – far removed from the concept of (urban) creative classes developed in the 2000s (Florida, 2002 and 2017) – which can emerge autonomously thanks to the fact that they can (more) easily access, possess or build the means of production, at least the ones with require less resources and are openly shared as open source hardware. This statement could sanction the possible return of the primacy of the individual to capital or the transformation of individuals from "simple" consumers of products to new consumers of processes (communication, manufacturing,...). In that sense, the extraordinary and growing concentration of economic, social and technological power held by the champions of the Third Industrial Revolution cannot be ignored. On the other hand, the rapid theorization of the transition from the Third to Fourth Industrial Revolution (Schawb, 2016) seems to bring back in the field of production of goods and services new and technologically advanced forms of supremacy by economic-financial capital. Forms of production that are developing through the computerization and robotisation of work, progressively disabling individuals with less creative and technological skills (Frey and Osborne 2013; Acemoglu and Restrepo, 2016) and introducing new forms of collaboration between human and non-human agents. The technological convergence between (big) data production and digitalization of products and production fostered by the Fourth Industrial Revolution logic is considered so pervasive that could influence the upgrading of Society, from Industry 4.0 to Society 4.0 (Floridi, 2014). The whole Maker Movement has then a role in this transition thanks to its efforts in democratizing digitalization of production with open and sharing processes.

1.2 The Maker movement: entering the second phase

Within this framework, the evangelistic and pioneering stage of the Maker Movement, fostered by techno-evangelists like Chris Anderson and Dale Dougherty (Anderson 2012; Hatch, 2014; Dougherty 2015), can arguably consider almost over. For example, signs of this transition can be found in the crisis of 3D Robotics, the drone business founded by Chris Anderson (Mac 2016), or in the bankruptcy of TechShop (Woods 2017). The impressive and fast growth of maker labs, maker spaces and Fab Labs[1], this defines a hype about their effective role as new production places characterised by open and peer-to-peer practices. Maker labs are and remain single spaces with factories or craft workshops. They have multipurpose technologies and multidisciplinary communities (professionals and amateurs) potentially able to materialise "almost anything" (Gershenfeld, 2005). But today, "anything" means overall materialise experimental prototypes, unique pieces, micro-collection and components that complete products made by other subjects. Economic and technological limits of many maker laboratories (basic technologies not easily upgradable because they are undercapitalized) combined with aesthetic, functional and material aspects of artefacts made by makers are still far from being appreciated by the market. In parallel, an increasing number of unemployed or with low wages designers and creative professionals need to transform themselves into self-employees or self-entrepreneurs and are then claiming easier access to the means of production. Finally, companies (mainly SMEs and craftsmen) need to digitally transform their products and production processes to intercept a new generation of customers that are evolving into community-users and user or free innovators (Von Hippel, 2005 and 2016).

From the beginning, the growth of the maker labs was accompanied by a series of reflections focused not only on the ability of these spaces to enable independent user innovators and maker communities, but also on their economic, technological, social and environmental sustainability (Troxler and Schweikert 2010; Wolf and Troxler, 2016; Kothala, 2015; Maldini; 2016). Many maker labs have been created and/or sustained thanks to or by public funds, or with personal financial resources or with poorly planned business models. The majority of them are economically undercapitalised and characterised by fragile business models (Clapaud, 2016).

1 The first Fab Lab was created in 2003; at the time of writing the total number of Fab Labs is now estimated at around 1,200 spaces (source: FabLabs.io)

In this sense, the recent bankrupt of TechShop (Woods, 2017), a commercial franchising of maker facilities roughly ten times larger than common Fab Labs or maker spaces, or the crisis of 3D Robotics (Mac 2016), reveal the problem of economic sustainability for the maker economy, in which they previously considered stars and relevant success cases. The business models of maker labs are based on a diversified mix of activities for different stakeholder groups: education, materialization of artefacts (prototyping and digital fabrication services), research and consultancy (pilot projects, research programmes), cultural events, communication. It is a volume of activities basically managed by very few people, which aims to stimulate the creation of a community-market made by professional and amateur users (Bianchini e Maffei, 2016) and (try to) collaborate with bodies, institutions and companies.

For many maker labs, the creation of "one's own makers' community", possibly composed of a large number of Makers Pro, user, free and citizen innovators (Eskelinen et al., 2015; von Hippel, 2016) and indie designers, represents one of the most important objectives. Makers' communities are made by undercapitalised individuals and professionals, people that can generally guarantee a low and discontinuous level of economic exchange with maker labs. Nevertheless, the existence and presence of a (basically) high skilled makers' community is fundamental for the maker labs. This aspect is crucial to increase the innovation potential of maker labs, their design and operational capabilities, their reputation and role within the international makers' community. In this way, these labs can become more innovative and attractive. In many cases, the creation and development of a local makers' community require maker labs to lower their barriers to access the space: investment in technology, organization of initiatives and events dedicated to the community, more favourable economic conditions for the use of machines. These conditions can lead maker labs to interact with the makers' community establishing a peer-to-peer collaborative and reciprocal logic. On the one hand, the maker labs support their communities to develop activities and experimental projects that can also lead to entrepreneurial initiatives. On the other hand, makers' communities can support the maker labs to organise activities aims at generating economies for these spaces: educational events, but also an extended growing participation in competitive research activities collaborating with bodies and institutions, and sometimes companies. The recent involvement of many European maker labs in competitive European research and projects (e.g.

H2020 CAPS project like MAKE-IT[2], OpenCare[3], OpenMaker[4], Digital DIY[5]; Creative Europe projects like Made@EU[6] and Interreg programmes like FabLabNet[7]) demonstrates this aspect. In particular, some of these projects work specifically to enables the growth and governance of the Maker movement in different directions: development of social innovation practices; stimulation of open source and digital maker practices and open design engaging citizens and institution; brings together mainstream manufacturers and makers in ecosystems, built to enable cross-boundary partnerships for innovation; creating a new distributed market for makers and designers[8].

1.3 Maker labs and companies

The relationship between maker labs and enterprises is different: it is less straightforward and can be influenced by territorial and political variables. In fact, maker labs can interact in many ways with companies, ranging from big corporations to local SMEs and craftsmen, to no interaction at all. As a starting point, there are several companies offering software and hardware for digital fabrication processes that are very "close" to the Maker movement and maker labs (either because they are their markets or because the companies themselves originated from them), supporting people and spaces providing them cost-effective technologies and/or tools or sponsoring their initiatives: examples can be found in Sparkfun[9], Adafruit[10] or WASP[11]. Established companies typically turn to maker labs as service for prototyping, or in other cases to organise activities such as workshops and hackathons having a double purpose: identify new ideas and/or talents to be integrated into their businesses. In France, companies like Airbus and Renault created their internal maker

2 http://make-it.io/
3 http://opencare.cc/
4 http://openmaker.eu/
5 http://www.didiy.eu
6 https://madeat.eu/
7 http://www.interreg-central.eu/Content.Node/FabLabNet.html
8 The Distributed Design Market Platform project (2017–2021) funded by EU in the Creative Europe Platform call works to create a European Commercial platform for independent designers and makers.
9 https://www.sparkfun.com/
10 https://www.adafruit.com/
11 http://www.wasproject.it/w/en/

spaces and are even establishing a network called Fab&co among these business-oriented internal spaces (Chevrier 2015). In Italy, a context characterized by the presence of local production systems based on manufacturing and SMEs, the maker labs have been started typically by private individuals or groups of them. Later, the labs started to network in regional clusters, sometimes with the help of regional institutions, in order to develop local collaborative systems capable of providing innovation services to local companies. An example can be found in the Mak-ER[12] network and in the Fab Lab Toscana[13] Initiative. Furthermore, companies also seek collaborations based not only on the development of products of services, but also for the support of strategic values: for example, large corporations such as Chevron have built partnerships with Fab Foundation (the foundation that emerged from the Center for Bits and Atoms at MIT in order to support the global Fab Lab network) in non-profit initiatives[14].

1.4 Collaboration between maker labs, designers and companies

The interactions between maker laboratories and enterprises take then several forms, pointing to a potential rich ecosystem of initiatives beyond the typical depiction of the Maker movement as just about DIY projects or manufacturing of only Maker products. Starting from this setting, maker labs can become an emerging "third party" in the traditional relationship between designers and companies, because digital technology and digital making are enabling an increasing population of indie creative professionals to act as designer-enterprises (Bianchini and Maffei, 2012). This connection is explored in few pieces of research that investigate, within the Maker movement, the working condition of makers and designers and how Maker initiatives improve their entrepreneurship attitudes and organizations while still being part of the movement. On one side, makers and designers (at least in Italy) are increasingly trying to transform their making activities into their main professional practice, but for only a part of them, this is possible (Menichinelli et al. 2017). This is not an easy task, and several archetypal trajectories are possible for the dynam-

12 http://www.mak-er.it/
13 http://www.fablabtoscana.it/
14 https://www.chevron.com/stories/fab-foundation

ic transition from makers to social enterprises and social entrepreneurs (Langley et al. 2017). Besides these contributions, the interactions between maker laboratories, designers and companies have been analysed only in very few cases. A preliminary and explorative search, conducted on scientific database (ISI Web of Knowledge and Scopus Elsevier) using a combination of research keywords ("fab labs", "makerspaces", "designers", "manufacturing", "SMEs", "Industry", "collaboration"), evidences a general lack of scientific literature (and knowledge) investigating the relationship between maker labs, designers and companies. There is a tiny number of scientific publications that cross at least two key research words. The most relevant topics are related to the potential of digital fabrication and peer-production in the maker communities, in the field of social innovation and in educational contexts. For these reasons, we decide to investigates *if* and *how* these three kinds of subjects are strategically working together in order to exceed their limits and develop collaborative production models related to the circular economy.

2. The analysis of collaborative processes between maker labs, designers and companies

2.1 Research Methodology

In the previous part, we defined in general terms who are the makers, how they interact with the maker labs, and how they are holding the emerging socio-technical challenges generating independent and peer-to-peer innovation. The purpose of exploring the role of makers from Third to Fourth Industrial Revolution is crucial towards a better understanding of how the phenomenon of maker spaces is evolving, specifically with companies and designer. In the previous part, we also tried to define the general nature of collaborative processes between makers, designers and maker labs, and between companies and maker labs, to better focus the basis and way of work of digital fabrication spaces. After that, we planned to develop and conduct an inquiry on a selected group of international maker spaces that will represent as the first prototype of a general survey should on a global scale. To have a better understanding of how maker labs are working or collaborating with designers and small, medium and large-scale enterprises in an international context, we decided to set up an online survey. The initial goal was to test a small-scale model of the survey to identify, circumscribe and analyse the first

range of activities that makerspaces have been doing for a couple of years. In particular, we aim to identify maker labs ways of working and how they had managed the projects developed collaborating with industry and companies, to know more about different ways of design, prototyping and materializing artefacts. Moreover, how they operate, the services they offer, and other activities that to stimulate the collaboration with designers and companies. The list of possible maker labs was made analysing that one with greater relevance or that have developed interesting projects and collaborated with companies. The first reference was based on the list of fablbas.io website (the global list of Fab Labs), where all the global laboratories are listed by country. One of the points to consider was to choose the countries that have more approved laboratories; this means that they are opening or developing many spaces like these because they have had positive results and they have generated impact on the economy, innovation or development of the region where they have been established. After that, an investigation was made to find best case studies through the fab lab´s webpage or social media, and see a general view of their way of working, some examples of projects and collaborations were founded, and according to this, the survey was formulated. The final selection takes into account the most important countries (US, Italy, and France); countries that have important international labs (super-nodes, e.g. Holland and Spain); countries that have important systems of design and large-scale industry (US, Germany and France) or small-medium industry (Italy and Spain), and finally countries characterized by a strong service-design sector (UK, the Netherlands).

2.2 Survey structure

The online survey was integrated with a total of 25 questions, some of them to open for general data and some others more specific and closed by check-list. For international Fab Labs in general, it was made in English language, and was applied through Google Forms; the link was sent by email with a personal request to each fabrication laboratory, and explaining them the objectives of the survey. The survey has been divided in five sections (see Table 1).

A total of 25 International Fab Labs and maker spaces has been selected and contacted intake part of the survey. 14 of 25 maker labs answered the survey (56%) in five months (May to August 2017) after three e-mails recall.

Section 1. General info about the Fab Lab / makerspace	Questions about History of the lab, employees and capabilities, equipment, activities and services.
Section 2. Fab Lab / makerspace system of relationship	Questions about skills of the lab community, network of relationship with designers, companies and other subjects.
Section 3. Relationship and collaboration with companies	Questions about companies that collaborated with the lab (sector, size, ...), kind and scope of the collaborations, and critical aspects and/or new opportunities related to collaborations.
Section 4. Relationship and collaboration with designers	Questions about designers that collaborated with the lab (disciplines, skills, ...), kind and scope of the collaborations, and critical aspects and/or new opportunities related to collaborations.
Section 5. Collaboration with companies and designers	Questions about projects that bring maker labs companies and designers together: kind of projects and outputs (e.g. distribution on the market), economic support received to stimulate the collaboration with companies and designers, critical aspects and/or ne w opportunities related to these collaborations.

Table 1. Sections and questions of the survey (general topics)

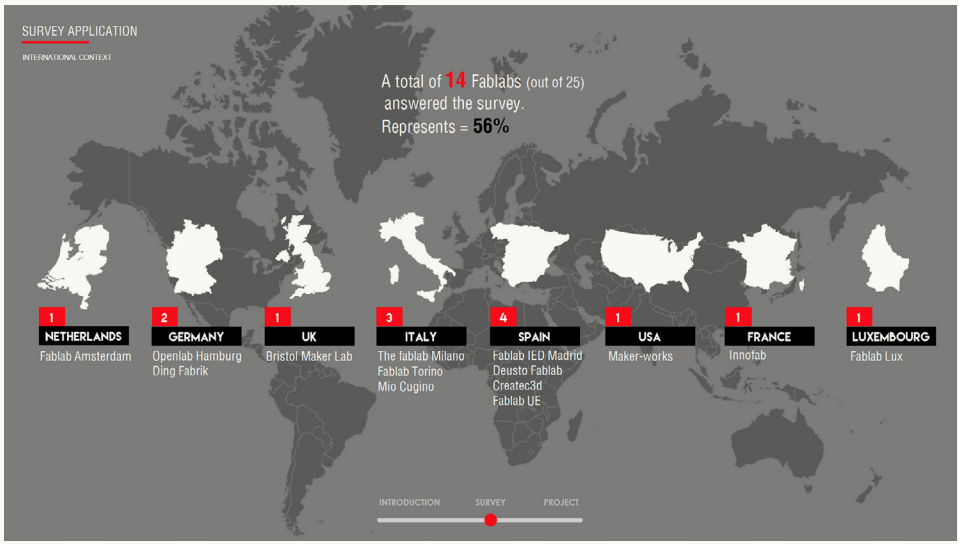
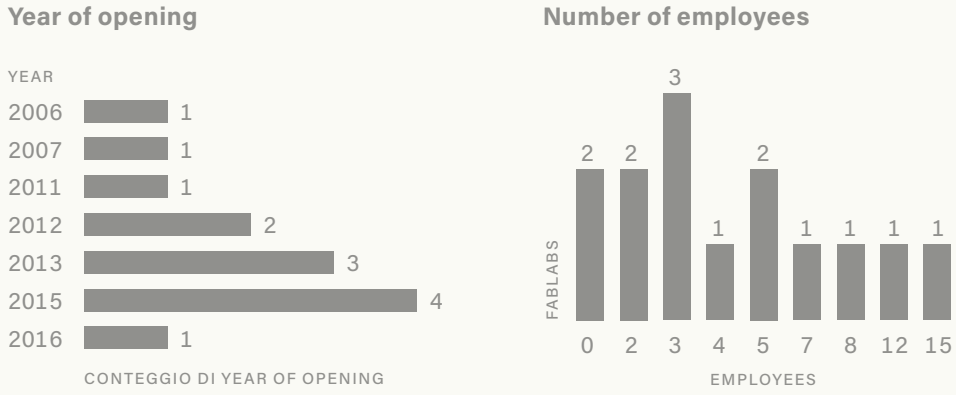


Figure 1. Map of the 14 Fab Lab / Makerspaces involved in the survey



Figures 2a and 2b. Year of opening and number of employees of the Fab Labs involved in the survey

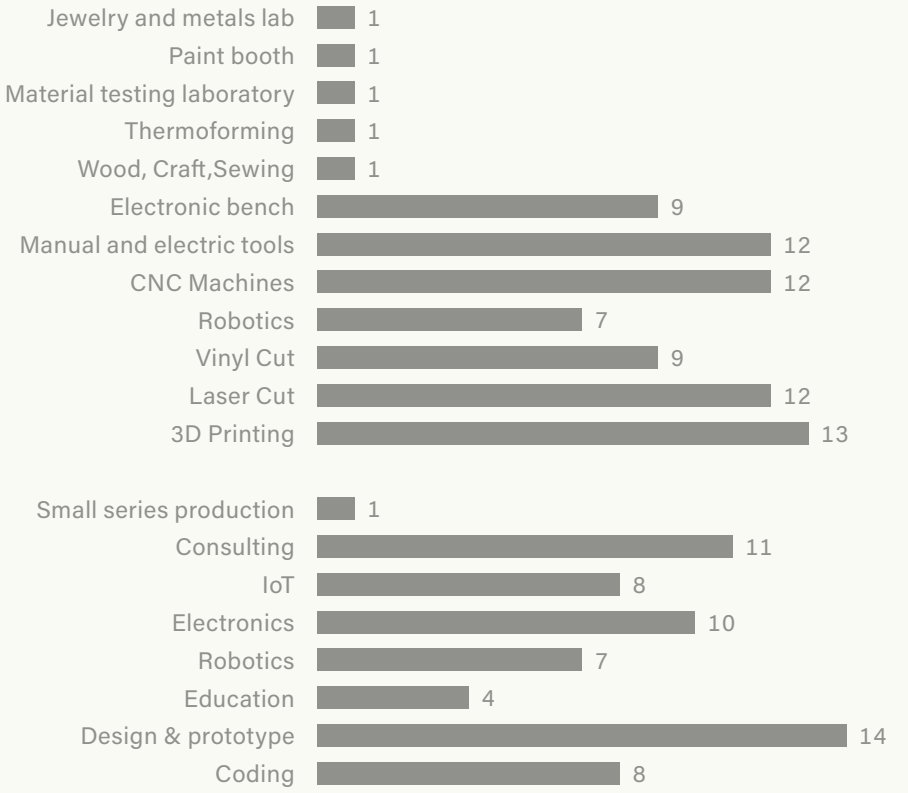
Other 11 maker labs involved that not answered the survey[15]. Possible reasons for the non-participation of these labs could be a lack of interest in the theme of the survey or a lack of time to participate.

2.3 General information about the Fab Lab / makerspace (Section 1)

In Europe, the maker movement and the establishment of fabrication laboratories began earlier than in other countries, for example, within the maker spaces that answered, we can observe that there are one establish since 2006 and 2007, following by one in the year 2011. Just like in other countries, we identify that between 2013 and 2015 was the hype period in which more Fab Labs and maker spaces started to appear, in this case, we can observe from the survey, that in 2015 there were established four of these. The Fab lab is typically small system with few employees. They are a community-based system where the population of participants is larger than the employed one. Looking at the numbers emerged from the survey in two of these maker spaces there are not employees[16] because rather they are more like enthusiast volunteers, people who love to make

15 Fablab Berlin (Germany), Protospace (Holland); Artilect (France), Makerversity (UK), OpenDot and Makers Modena (Italy), Artisans Asylum, NYC Resistor and TechShop (US)

16 Fablab Torino, Dinkfabrik.



Figures 3a and 3b. Technical equipment and skills/expertise of the Fab Labs involved in the survey

and share and organise themselves, in the other ones there are between 2 and 15 employees, from these laboratories that answer, the average is five employees for each one.

It is possible to see from the answers that not all these spaces are Fab Labs, as intended and structured by the Fab Academy. There is difference in the equipment and technologies, the most diffuse, maybe because costless and easy to be used, is the 3d printer, just in one, there are not. Other diffused equipment are the Laser cutters, manual and electric tools and CNC machines. In less quantity, there are also in some of these labs thermoforming machines, paint booths and jewellery workshops; this is in function of the context specialization and locations.

Design and prototype is the most common service this maker space offers. As known and discussed in the previous paragraph there are not

defined and sustainable business model for this kind of spaces; this reflects the differences in the diffusion of services and targets. In fact, rather than Design & Prototype, they offer different kind of consultancy to companies, schools, start-ups and people reflecting the general and large interest of the makers' movement. IoT, electronics and robotics are also popular within this fabrication laboratories. Is quite strange that only four centres offer education services just because this centre has a typical social function and many of them work as social enabler. From the survey emerges that maker labs are not (mass) production sites but micro and self-production sites.

2.4 Fab Lab / makerspace system of relationship (Section 2)

The community that lives these spaces is defined and sectorial. The knowledge needed to be active in these spaces don't make them open. A technical and skilled community made by Designers, Engineers, Students, Makers is the most prominent in the maker spaces, followed by architects, artists, entrepreneur people, and craftsmen. Is interesting to be noted

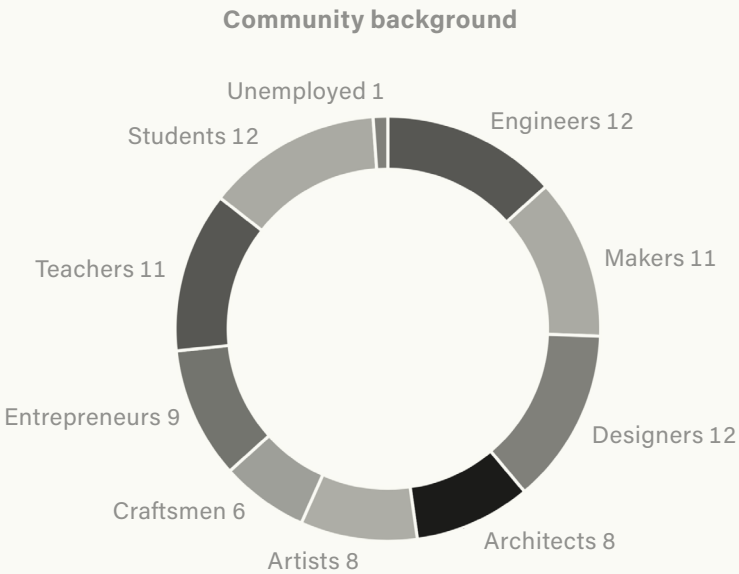


Figure 4a. Community background

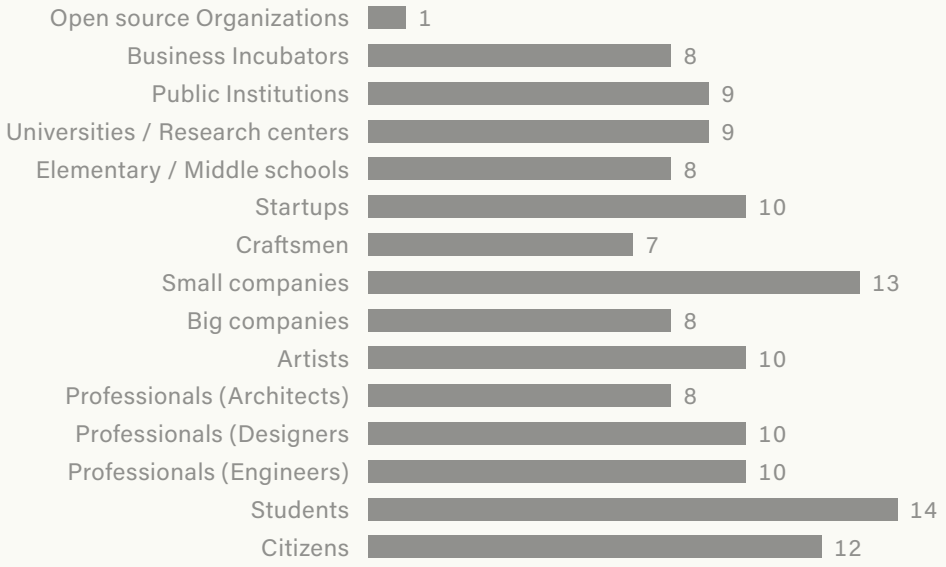


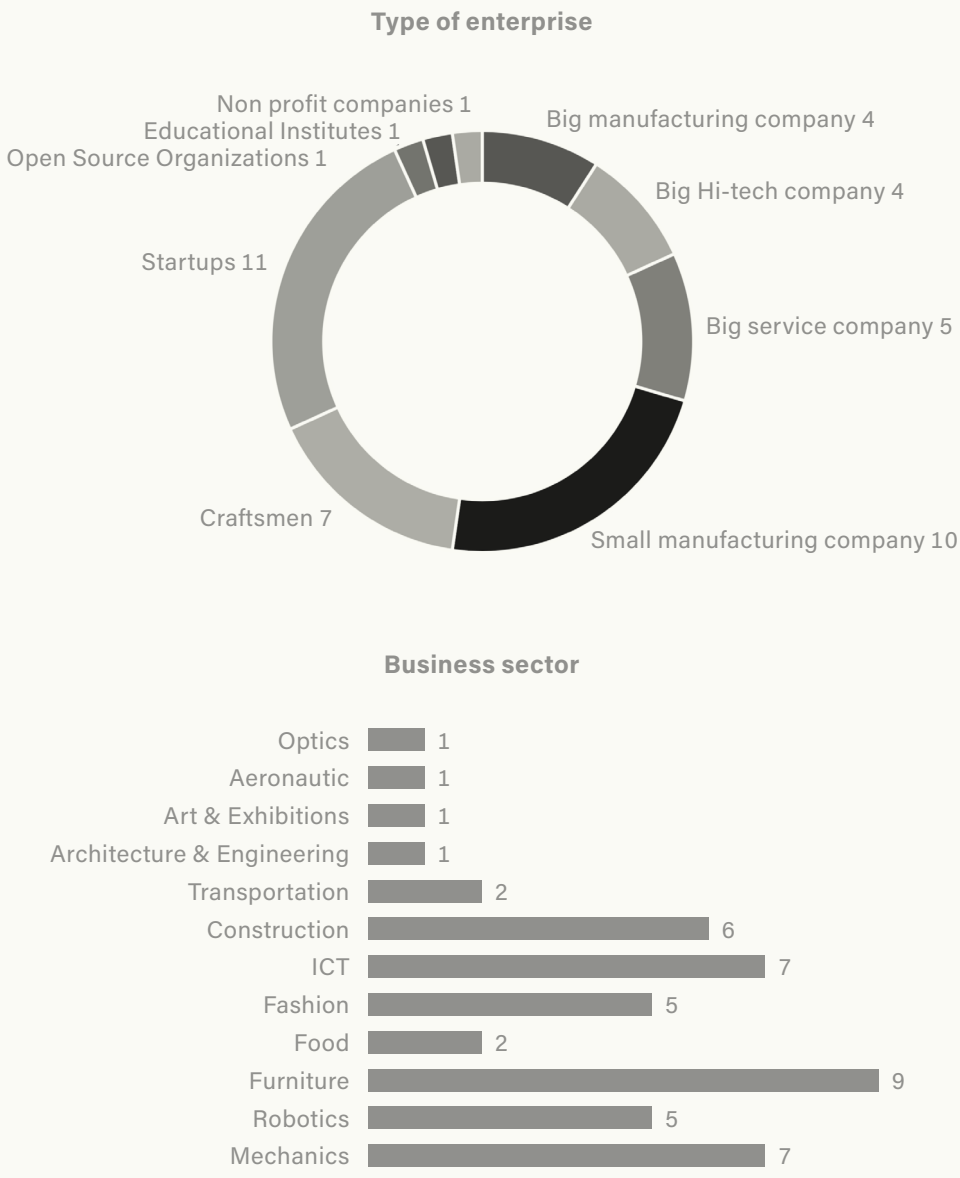
Figure 4b. Network of relationship of the Fab Labs involved in the survey

that in only one case unemployed people assist to these spaces, this highlight a potential of this spaces in employability, the capability of getting and keeping satisfactory work improving and renovating skills[17]. Students and small companies are the entities whom makerspaces collaborate the most. Regarding the professional areas, design, engineers and artist are important in the relationship with the Fab Labs; start-ups are also common in this type of centres. Sometimes, they conceived and develop a project that later is launched on the market.

2.5 Relationship and collaboration with companies (Section 3)

Among these laboratories there are some of them that have collaborated with more than 50 companies; some others even more than hundreds of them; some makerspaces don't keep a record of the number of projects

17 .Some spaces are working in this way, in the Ex-Filanda di Sulbiate (http://www.exfilanda.it/) the makerspace (http://www.makeinprogress.org/) works in relation to an employment office (Mestieri Lombardia) and offers training for the citizens and unemployed people, like the NEET (Not in Education, Employment or Training)



Figures 5a and 5b. Type of enterprise collaborates with the Fab Labs and related sectors

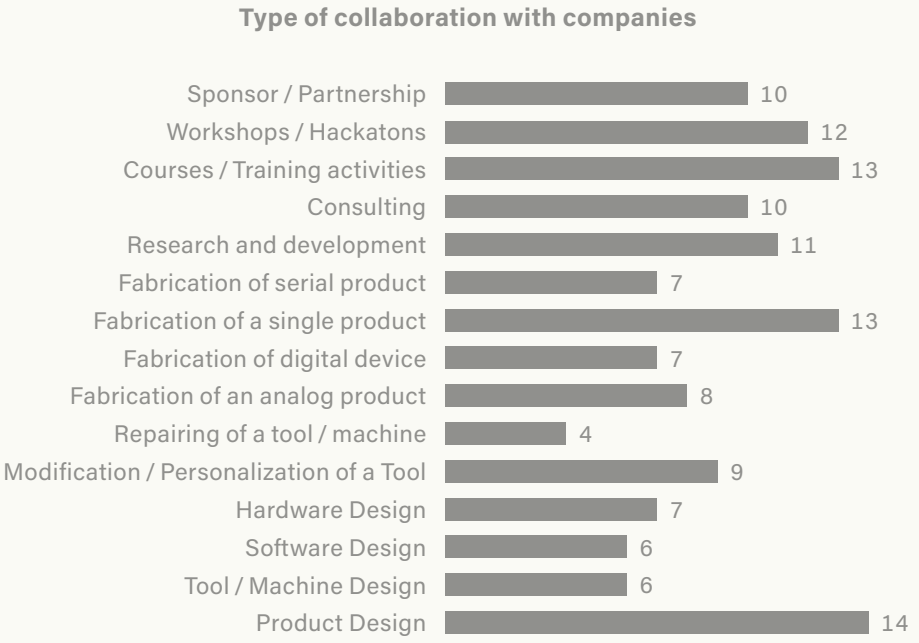


Figure 6. Types of collaboration with companies and services

or collaborations they do with companies. They just said that there were too many as well. On the other hand, some others have collaborated with a few companies, between 2 and 20. This means that there are not established relations between companies and Fab Labs. The numbers don't give us any structured indications because in some "experimental" projects were involved a large number of companies rather than structured activities were the relation usually is one to one. Also, there were no data on the continuity of the collaboration.

This aspect is confirmed also looking at the kind of companies they have been working with, most of them are start-ups, craftsmen and small manufacturing companies. The service offered is about consultancy on product design, since the generation of ideas to the design and prototyping until the phase of testing. This suggests the option for some of them to work as design and prototyping consultancies. In fewer cases, they worked with big companies (services, high tech and manufacturing) probably in experimental and contamination project (hackathons and workshops). Sims that businesses are attracted or fascinated by this kind of places and people, they try to collaborate if there is any free access or

experimental action (often paid by public or research funding) after that apparently each one goes in its' one way. The numbers emerged don't give us a better perception of the sustainability of this kind of services for the makerspaces, we are discussing in less the 40 companies for 14 makerspaces. All the maker labs analysed organize courses and training activities, workshops and hackathons. Most of them develop research activities in order to support small and medium companies in the development of new products. Going through the sectors, there is a strange mix of low-tech and high-tech sectors. The most important are the low complexity sectors such as Furniture, Mechanics, Construction, Fashion, Food that could be compared to the competences of the community discussed in Section 2. In the other hand, probably in the centre connected with universities or research centres, there is a sort of tech orientation with Robotics, ICT, Aeronautic and Optics.

2.6 Relationship and collaboration with designers (Section 4)

Also, deepening the relationship between makerspace and designers emerge the situation verified with the companies. Broad numbers of designer and a reduced number of projects/collaborations, most of them experimental or episodic. The numbers don't give the exact picture of this relationship if not connected with the typology of projects/actions and the continuity of this offers. Many of the makerspace involved don't keep

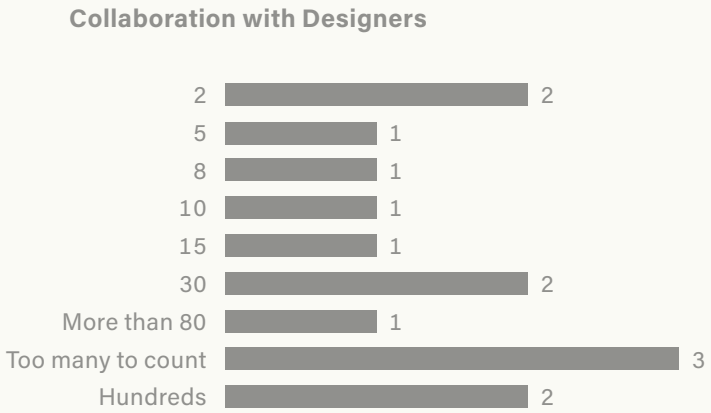


Figure 7a. Collaboration between designers and FabLabs.

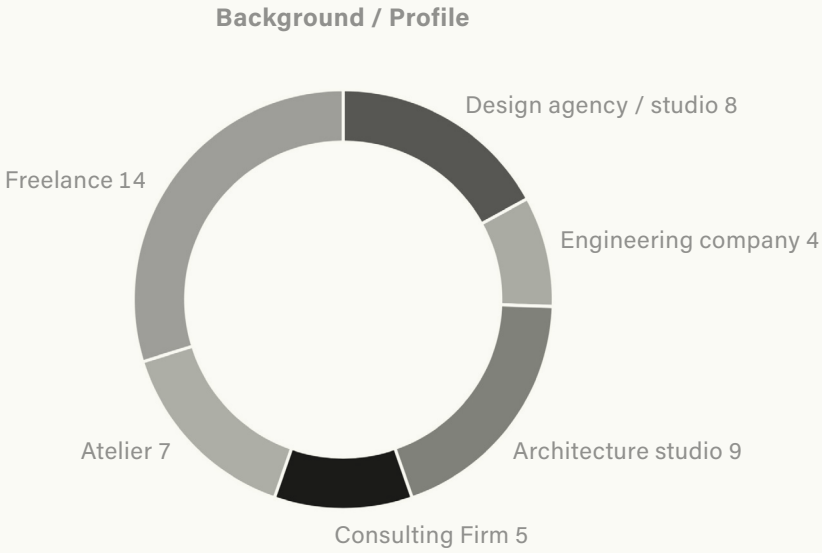


Figure 7b. Background/profile of the designers

record of the designers' collaborations this means that typically designer goes to the maker space to experiment, test, meet people, solve technical problems and making prototypes. This usually happens also with no cost.

2.7 Special projects with companies and designers (Section 5)

After reviewing the projects in which the makerspaces had collaborated with companies or with designers, the following question was if they had done any collaboration in which they integrate these two entities together to work with them. According to the answers, nine makerspaces (65%) said that they had collaborated, meanwhile, 5 of them (35%) said no. They were asked about any incentive or financial support from an institution to develop a project with companies and designers; among the options, they could choose more than one, they replied that 7 of them had requested support to the government, to public organisations and also have received money from companies. Two of them have obtained support from Schools/Universities, one of them from local syndicates. Two makerspaces have not requested or received any incentive. This

highlight a situation where makerspace are demonstrative spaces, all the most relevant collaboration and activities are connected to specific research or experimental action founded by public or private institutions or companies. This kind of projects/collaborations is a valid source of funding for the spaces but is unfortunately episodic; this affects the Business Model and the growth possibilities of the Space. They remain small and also the technology doesn't evolve after the setup. In fact, all the Fab Labs and makerspaces interviewed are interested and willing to participate in projects that involve Companies and Designers together especially the ones with the right funding to pay people, space and infrastructures.

3. Conclusions

According to what we investigate about the several initiatives and global proposals, what is coming and follows all this movement, is take advantage of the machines and technologies and participate in critical development processes impacting the maker community at a state or local level. This can also take shape as key stakeholders across different sectors like universities and industry, to identify and collectively develop ways to address key needs, making several changes to the neighbourhoods and cities and generate new digital manufacturing alternatives based on real needs through a sustainable, innovative vision that help and support national production and development, using innovation centres like Fab Labs and makerspaces as innovation and cultural hubs at the local scale.

In synthesis, both critical and positive aspects emerge from the survey. First of all, the current situation of Maker Labs. After 15 years characterised by an initially low level of diffusion and exponential growth of Fab Labs and makerspace, probably the highest phase of their Hype Cycle is done. This aspect is neither good nor bad: it is both real and reasonable. Many of these labs have been launched thanks to first public funds, and now are facing the challenge to be economically sustainable, but also environmentally and socially. At the same time, the whole Makers movement is now in the crucial challenge of growing economically, increasing and "making official" their level of professionalism, including the ability to evolve making (and makers) as possible on traditional markets: a "new third way" to the production of goods strictly connected to the circular economy. To date, there is still no an official market for the

maker economy and maker labs are not yet credible players for the circular economy, especially in urban contexts[18].

Despite, as shown by the survey, the makers lab are probably platforms able to build large networks that make users-citizens, professionals and businesses interact. Moreover, the growing emphasis on the Fourth Industrial Revolution, which in some productive contexts such as Italy has already excluded Fab Labs to the access for technological innovation to companies. They cannot access to the funds to evolve themselves in "lab 4.0", and at the same time, they cannot be involved by the other manufacturing companies (mainly SMEs) to develop experimental projects on IoT production or technological revamping. The crucial question, as also emerges from the survey, is that Fab Labs are structures that think and work "for projects". In most of the cases, maker labs work and are innovative if there are public or private commissions for research, innovation and consulting projects. Or, if the labs even if they are autonomous, are highly connected to a productive, territorial and/or social contexts which have a broader economic, social vision/project and officially recognises them as relevant actors. Without this support – which in reality should be considered a path of co-evolution with companies and institutions – maker labs are "forced" or "condemned" to fight for survival or, in the most virtuous cases, to be only activators or pre-incubators of innovation that find an economic and productive development in other contexts. This is because the maker labs with their "technological standard" available to them today cannot reach the quality that allows projects/products to break into the market. And the problem is that this standard can be competitive still for a few years. The risk for these spaces is to gradually exhaust their ability to be attractive not only for businesses but primarily for professionals and user innovators, in other words, the maker communities. By eliminating these possibilities, the use of these spaces for training purposes and technological literacy would remain the main (or the only) option. But without the relationship with businesses and professionals, it would undoubtedly be less effective.

The data demonstrates that the pioneer era is almost done. We are in a maturity step where more structured business models and growing processes are needed. The emergence of different research projects, many of them backed by the EU funding, might also be interpreted as a sign of

18 http://market.fablabs.io/ it constitutes only an embryo of a real market of the products developed by makers with maker labs.

maturity of the movement. Shifting from the evangelistic phase to a more "conscientious" one, still in its early steps, characterised by a more rigorous practice and research that at the same time interacts with established stakeholders like public institutions and companies. Making seems to be no more the scope of the activities but the means or the philosophy. Making better policies, better society, better competences to find creative, alternative and effective ways to the Industry 4.0 with a social and circular approach.

Massimo Bianchini
PhD, assistant professor,
Politecnico di Milano,
Dipartimento di Design, Polifactory, Italy
massimo.bianchini@polimi.it

Venanzio Arquilla
Associate professor,
Politecnico di Milano, Italy
Dipartimento di Design,
venanzio.arquilla@polimi.it

Massimo Menichinelli
Project manager,
IAAC, Fab City Research Lab, Italy
massimo@fablabbcn.org

Guillermo Gustavo Florez Vazquez
Independent researcher,
memofv10@gmail.com

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Annex 1. Survey Structure

Section 1 General info about the Fab Lab / makerspace	contact person and role year of opening number of employees lab capabilities lab activities and services
Section 2 Fab Lab / maker-space system of relationship	professions skills and background of the lab community projects and collaborations developed with designers, institutions and companies
Section 3 Relationship and collaboration with companies	number of companies have been collaborated with the lab type of enterprises business sector kind of collaboration between the lab and companies most important projects developed by the lab with companies limitations before or during the projects
Section 4 Relationship and collaboration with designers	number of designers have been collaborated with the lab designers' background field of activity in the design sector most important projects developed by the lab with designers limitations before or during the project
Section 5 Collaborations with companies and designers	economic support/incentive to develop research and/or projects with companies and/or designers participation in projects that bring companies and designers together most important projects developed with companies and designers the project has been distributed on the market limitations before or during the project other kind of projects developed with companies and designers interest to participate in projects that stimulate the collaboration companies and designers together).

Table A1. Sections and questions of the survey

DingFabrik Köln (Germany)	http://www.dingfabrik.de/ www.facebook.com/dingfabrik/ Opening year: 2011 Number of employees: n.a.
Openlab Hamburg (Germany)	http://openlab-hamburg.de/ www.facebook.com/openlabhamburg/?rf=1206387326106054w Opening year: 2016 Number of employees: 8
FabLab Amsterdam (The Netherlands)	http://fablab.waag.org/ https://www.facebook.com/fablab.amsterdam Opening year: 2006 Number of employees: 12
Bristol Maker Lab (UK)	http://kwmc.org.uk/projects/bristolmakerlab/ Opening year: 2015 Number of employees: 3
The FabLab – Milan (Italy)	http://www.thefablab.it/ www.facebook.com/thefablab/ Opening year: 2015 Number of employees: 5
Fab Lab Torino (Italy)	http://fablabtorino.org/ www.facebook.com/fablabtorino/ Opening year: 2012 Number of employees: 0
Mio Cugino – Milan (Italy)	http://www.miocugino.com/ www.facebook.com/miocugino/ Opening year: 2013 Number of employees: 4
FabLab IED – Madrid (Spain)	http://fablab.iedmadrid.com/ Opening year: 2015 Number of employees: 7
Deusto FabLab – Bilbao (Spain)	http://ingenieria.deusto.es/cs/Satellite/ingenieria/es/deustofablab https://twitter.com/deustoFabLab Opening year: 2015 Number of employees: 3
Createc3d – Granada (Spain)	https://createc3d.com/ www.facebook.com/createc3d/ info@createc3d.com Contact: Juan Robles, Technical and Design Service Opening year: 2013 Number of employees: 3

Table A2. List of maker labs answered the survey
(continues on next page)

FabLab UE – Madrid (Spain)	http://fablab.uem.es/ https://www.facebook.com/fablabue jose.real@universidadeuropea.es Contact: Jose Real, Fablab coordinator Opening year: 2015 Number of employees: 5
FabLab Lux – Esch sur-Alzette (Louxembourg)	http://www.innofab.fr/ www.facebook.com/innofabcastres Opening year: 2015 Number of employees: 2
Innofab – Castres (France)	http://www.innofab.fr/ www.facebook.com/innofabcastres Opening year: 2015 Number of employees: 2
MakerWorks – Ann Arbor, Michigan (US)	http://maker-works.com/ www.facebook.com/MakerWorx/ Opening year: 2012 Number of employees: 11–15

Table A2. List of maker labs answered the survey
(continues from previous page)

SURVEY APPLICATION

INTERNATIONAL CONTEXT

COMPANIES	PROJECTS 35	ENTERPRISES 1° Startups 2° Small Manufacturing Companies	SECTOR 1° FURNITURE 2° ICT/ Mechanics/ Robotics	COLLABORATION 1° PRODUCT DESIGN 2° COURSES/ TRAINING ACTIVITIES /WORKSHOPS
DESIGNERS	PROJECTS 28	PROFILE 1° FREELANCE 2° DESIGN STUDIOS / AGENCIES	SECTOR 1° PRODUCT DESIGN (General) 2° FURNITURE (Specific)	

Table A3. General data about developed by Fab Lab / Makerspaces with designers and/or companies

Foresight by design

Supporting strategic innovation with systematic futures thinking

Jörn Bühring, Jeanne Liedtka

Abstract

This conceptual paper draws attention to the growing need for organisations to meet the demands of rapid social and technological changes, and to practice foresight at the front end of innovation. While most product or service innovations focus on meeting current market needs (typically over a 1–3-year time period), there is still precious little real understanding in how designers and interdisciplinary innovation practitioners learn to navigate disruption, make sense of complexity, and deal with uncertainty of social and technology environments over the medium and long-term time horizon (5–15 years). Acknowledging the complexity of socio-technological systems, stakeholders in design innovation have to work together to envisage higher order, more innovative, and sustainable solutions that will yield the greatest economic and social benefits (Buhring, 2017; Heskett, 2009; Hines & Zindato, 2016; Liedtka, 1998; Meroni, 2008; Slaughter, 2002). In this paper, we review the strategy, design and foresight literature at both macro and micro levels, with emphasis placed on how interdisciplinary innovation practitioners may engage with the future in order to explore the challenges to decision-making they highlight (Ferraro & Cassiman, 2014). From this review, and a series of facilitators identified by our own design and foresight field research, critical perspectives are presented that illustrate how foresight by design can inform decision-makers of the innovation challenges and opportunities that will emerge over the medium and longer-term time horizon. Consequently, optimising foresight as a core capability may strengthen the organisation's sense of direction and its capacity to innovate in the face of social and technological uncertainties (Kock, Heising, & Gemünden, 2015). Derived from these insights, we set out some hypotheses around the broader role of the strategic design conversation to include systematic futures thinking as a common language and transformational approach to producing visions of preferable and desirable futures. Practicing systematic futures thinking, we argue, will foster sustainable innovations by detecting early warning signals of change and giving deeper insights into the phenomenon behind these signs. Subsequently, applying systematic futures thinking could become concrete knowledge and processes for strategic innovations in product and service industries. This conceptual approach, moreover, will offer important considerations that may help overcome weaknesses in the alignment

of visions between strategy, innovation and foresight functions, which is the purpose of design thinking and practice.

Theme: Innovation
Keywords: strategic innovation, foresight, futures thinking, managing uncertainty, preferable futures

1. Introduction

In this more competitive second decade of the 21st century, meeting the demands of rapid social, technological and environmental change is forcing continues attention to the organization's vision and strategic direction of dealing with uncertainty (Hamel & Valikangas, 2003). Global economic integration (or globalization) is only one of the many challenges facing organizations in an ever-more interconnected social, technological and environmental world, where no firm can retain a competitive edge independently of others (Ireland & Hitt, 1999). Derived from comprehensive research into the drivers of uncertainty involving business leaders (see Ferraro & Cassiman, 2014), Cassiman (2015) argues that the drivers of uncertainty (globalization, digitization, communitization and politicization) have a direct impact on the innovation eco-system.

Indeed, across the literatures of strategic management, foresight and design, extensive references have been made to the external business environment as a major source of uncertainty for strategic decision-making (Hamel, 2002; Heskett, 2009; Hofer & Schendel, 1978; Rohrbeck, Battistella, & Huizingh, 2015; Slaughter, 2002). In business, the purpose of strategic planning is to assess a current status against a set of environmental factors, thus determining an organizational roadmap (mission goals) based on a vision for the future (Kaplan & Beinhocker, 2003). The success of a strategic plan is reliant on adequate information that informs the objectives, strategies, decision-making, and measuring of results against a set of goals (Miller & Cardinal, 1994). The lack of certainty is derived from a state of having limited knowledge over the existing externalities, the future outcome, or possible outcomes (Simon, 1955). Furthermore, the limitation of strategic planning is often based on strategic decisions, which are primarily derived from interpreting information about the past and present (Mintzberg, 1994).

Developing an organization's strategic innovation direction against a rapidly evolving business environment, might pose further challenges;

for example, Clark and Fujimoto (1991) have argued that the process-driven approach to strategic planning can impose constrains on creativity and imagination of new innovations. Comparably, studies in the field of strategic management have identified that strategic planning and strategic thinking are two distinct thinking modes. That is, strategic thinking is intuitive, experimental and disruptive, and applied to create scenarios which help formulate a vision of where the organization should be heading (Heracleous, 1998; Liedtka, 1998). Hence, creativity and imagination ought to be considered as important factors when the objective is to detect emerging opportunities, or threats, resulting from macro drivers of change in a company outside environment.

Across nearly all sectors of the economy, the axiom is that organizations have to respond to change in fundamental new ways if they are to be successful in the future. Irrespective of a disciplines' spoken language: Designers speak of solving "wicked" problems, biologists talk of complex adaptive systems, behavioural economists focus on evolutionary growth theory; "...behind all of these differences in nomenclature lies a widespread suspicion that the mechanisms that ensured survival and indeed prosperity in a stable and predictable world – ones based largely on hierarchical control – are likely to be ill-suited to an increasingly complex and uncertain new one" (Liedtka, 2017, p.23). In spite of the wide-spread acknowledgement of growing uncertainty over the rapidly changing external macro-business environment, however, a certain consensus seems to exist that most product or service solutions continue to be informed by current market needs, and over the short-term (1–3 year) time horizon (Heger & Rohrbeck, 2012; A. Wilkinson, Mayer, & Ringler, 2014).

More recently, this development has prompted a call for business leaders and educators to become more forward-thinking, and to develop the organization's innovation and creative capabilities to remain feasible in the long-term (Kock et al., 2015; Koen et al., 2002; Van der Laan & Yap, 2016). That is, making decision based on simply projecting today's market trends into the future is no longer possible (Saritas & Smith, 2011; Vecchiato, 2015).

In this paper, we review the literature spanning a diverse set of disciplines at both macro and micro levels, with the emphasis on how innovation stakeholders may engage with the future in order to explore the challenges to decision-making they highlight. From our review, purposefully across design and foresight disciplines, we draw attention to our limited understanding of how designers and interdisciplinary innovation

practitioners learn to navigate disruption, make sense of complexity, and deal with uncertainty to envisage the medium and longer-term futures (5–15 years) of social and technology environments (Figure 1). Derived from our own previous design and futures thinking field research, key conceptual foresight facilitators are identified, which form the basis for systematic futures thinking approaches directed at the front end of innovation.

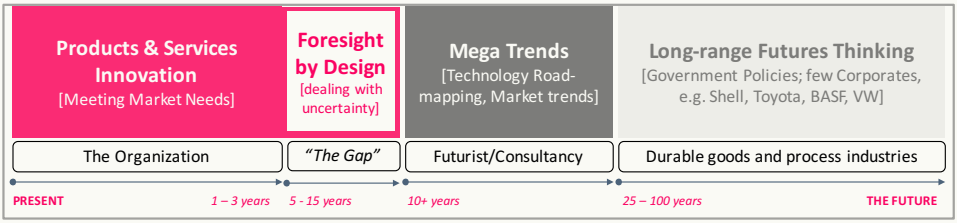


Figure 1. "Foresight by Design" – addressing the 'systematic futures thinking gap' across the medium to longer-term time horizon

2. Foresight by design – context and definition

The contribution of our conceptual paper is to stimulate awareness of the strategic and collaborative function of "foresight by design", which we define as systematic futures thinking of preferable and desirable futures, thus embracing uncertainty with action-provoking synthesis (futures scenarios) envisaged from the dynamics of society and technological advancements (Buhring, 2017; Buhring & Koskinen, 2017; Liedtka, 2017). We deliberately used the term "futures thinking" to embrace a common language between multi-disciplinary stakeholders applying design thinking methodologies to problem-solving, and foresight techniques designed to inform strategic opportunities for innovation that build on shared visions of preferable or desirable futures.

Specifically, we argue that the decision-making process applied to the front end of innovation can benefit from systematic futures thinking across the medium and longer-term time horizon (5–15 years). That is, dealing with uncertainty by collecting intelligence and analysing choices to minimize the risks inherent in the innovation process (see Simon, 1955), also presents opportunities for systematic futures thinking of alternative futures that are sustainable in the face of social, technological, and environmental challenges in this 21st Century. In this context, futures thinking can be seen as types of activities focused on detecting medium to longer-range opportunities and possibilities for strategic innovation,

as the 'results from foresight [deliver] an important feed into the innovation process' (Rohrbeck, 2012, p. 445).

3. What is the role of Design in business and innovation?

Though originally focused on the new product development field, the role of design in business has gradually expanded beyond merely creating and communicating better products and services. Design is now being understood by its totality of activities in form of competencies and capabilities that span across the entire innovation eco-system, involving interdisciplinary stakeholder teams responsible for creating sustainable value propositions that ensure the organization's future (Bohemia, Rieple, Liedtka, & Cooper, 2014; Buhring, 2017; Heskett, 2001; Lojacono & Zaccai, 2004). The expansion of design as a strategic capability in business and innovation, is often addressed through strategic (or advanced) design activities which enable the designer to consider hard constraints imposed by an organization (internal environment), against ecological and social impacts, and the cultural sensibilities and symbolic meaning that inform scenarios of external environments in a rapidly changing society (Daalhuizen, Badke-Schaub, & Batill, 2009; Meroni, 2008).

Strategic design, for example, has played a key role in Product Service Systems (PPS), shifting the innovation focus from product design to an integrated product-service solution (Manzini & Vezzoli, 2003). More recently, globalization, technological advancements and increasing business complexity have placed new demands on strategic design to go beyond satisfying short-term innovation goals (Manzini & Meroni, 2007). Design principles applied in the development of an organization's future-orientation, have positioned strategic design as an organizational competence that looks beyond one-time creative outputs (products or services), toward design as an organizational activity that can lead to sustained innovation and competiveness (Boztepe, 2016; Heskett, 2001; Mozota, 1998). In related research (Buhring & Koskinen, 2017), we identified specific design practices developed to deal with the future. These, for example, build on studies of extreme users inspired by von Hippel's notion of lead users (Djajadiningrat, Gaver, & Fres, 2000), practices in crowdsourcing (Kurvinen, Koskinen, & Battarbee, 2008), and experience prototyping techniques (Buchenau & Suri, 2000). A recent trend in design is also propounding fiction as a way to envisage or create futures (Bleecker, 2009; A. Dunne & Raby, 2013).

Concurrently, progressive organizations over the past two decades have noted the favourable use of design principles applied to problem-solving, sparking the popularity of design thinking processes and applications toward transformative innovations in a global economy (D. Dunne & Martin, 2006; Liedtka, 1998; Oster, 2008). Indeed, while the value of design thinking is almost always seen to be improvements in the creativity and usefulness of the solutions produced, the methodology has further potential for unifying interdisciplinary stakeholder conversations that enhance a collective's ability to align, learn, and change together (Liedtka, 2017). In coupling these perspectives, the hypothesis is that systematic futures thinking activities can offer decision-makers a holistic view on looming issues. The role of design, particularly its creative thinking, scenario building, visualization and prototyping competencies, may help produce tangible images that further advance collective visions of futures as preferable and desirable (Buhring, 2017; Buhring & Koskinen, 2017; Heskett, 2001; Koh, Slingsby, Dykes, & Kam, 2011; Manzini & Vezzoli, 2003). That is, the advantages of futures thinking applied at the front end of innovation, can lead to the creation of future value, and the development of perceptions about futures that may inform decisions or strategies needed to prepare for alternative possibilities. While most organizations fail to look beyond a narrow set of factors, evidence suggests that firms who have recognized the powers of futures thinking and strategic design approaches as an important resource in the innovation process, are indeed those who achieve sustainable competitive advantages (Grant, 2010; Heskett, 2009; Mankoff, Rode, & Faste, 2013; Martin, 2009).

4. What is the role of Foresight in business and innovation?

The foresight discipline encompasses a wide range of approaches and activities designed to help business stakeholders deal with uncertainty (Inayatullah, 2008). Slaughter (2002), in Voros (2003, p.4), positions foresight applied in business as a pragmatic approach to addressing the strategic questions of how to survive in an increasing competitive environment. Foresight methodologies use techniques such as macro trend analysis and expert knowledge to explore alternative futures (Figure 2) and classify them into *possible*, *plausible*, *probable*, and *preferable* (Hancock & Bezold, 1993; Voros, 2001).

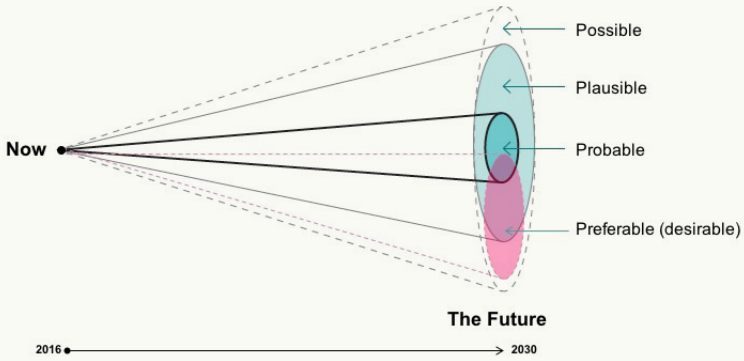


Figure 2. The "future cone" – adapted from Hancock and Bezold (1993)

The very objective of foresight is to consider different ways (alternative futures) in which the external environment may evolve over the next 5–15 years, or even longer (Dator, 2009; Slaughter, 2002; Voros, 2003). To illustrate its significance, designers and interdisciplinary innovation stakeholders may ask, "what would the response to uncertainty have to be if a future were to unfold that was distinctively different from the one anticipated in the current strategic innovation plan"? Foresight methodologies express these type of inquiries in form of futures scenario statements that help prepare for, or actively shape the future, and these methodologies are usually qualitative rather than quantitative in nature (Cuhls, 2003).

The practice of foresight is effective when decision-makers let go of their subjective views of reality (i.e. emotions, personal judgement), and align these more closely between the objective reality (fact-based, measurable and observable) and possible futures (Mietzner & Reger, 2005). In other words, thinking about different possibilities through futures scenario building, allows decision-makers at the strategic end of innovation to envisage different futures possibilities and outcomes. Consequently, a systematic approach to futures thinking is based on futures scenarios that explore holistic, integrated, and alternative futures, enriched through design as tangible images of how preferable and desirable futures might be shaped. Contrary to the conventional practice of extrapolating trends from the present (i.e. forecasting), futures scenarios are speculative images of preferable and desirable futures that form a necessary foundation of the scenario planning process (Slaughter, 2000; L. Wilkinson, 1997).

Consequently, combining design and foresight principles may help decision-makers deal with the uncertainties through futures scenarios and tangible images based on different possibilities, and then selecting and integrating the most preferable and desirable futures in the strategic innovation planning process.

5. Design and foresight as an evolving relationship

In seeking opportunities to link futures thinking capabilities to strategy and innovation, scholars have identified parallels in the fields of design and foresight (see Buhring & Koskinen, 2017; Evans, 2012; Hines & Zindato, 2016; A. Wilkinson et al., 2014). Describing such parallels between the foresight and design disciplines (Hines & Zindato, 2016), Hines (a futurist) and Zindato (a designer) identified and analysed the common use of scenario building practices in anticipating alternative futures. In design practice, typically, scenarios are developed to communicate, validate and endorse design decisions about user actions in the micro scale product and service development context (Evans, 2003; Martin, 2009). Comparatively, in foresight, scenarios are developed as stories about alternative futures at macro scale, or across whole systems (Hines & Zindato, 2016; Rasmussen, 2005).

In design practice, more commonly the use of scenarios at varying stages of the innovation process is closely aligned with detecting insights from users addressing their current needs (Martin, 2009). While in foresight practice, scenarios are used to create stories about how futures might or could develop, and what should be done to prepare for these eventual changes in the organizations' surrounding environment (Chan & Daim, 2012; Slaughter, 1995). This can also be visualized based on the aforementioned future cone (Hancock & Bezold, 1993), where the design thinking realm is concerned with scenarios based on identifying current user needs (1–3 year time horizon), while futures thinking is needed anticipating future scenarios based on opportunities that may inform consumer needs they cannot articulate – or may not yet know they want and desire (Figure 2).

Consequently, across both fields an obvious relationship evolves around the use of scenarios as evidence-based narratives, which are ultimately designed to help innovation teams, and their organization, identify and make better informed choices. To this end, the linkage between foresight and design principles become hybrid futures thinking

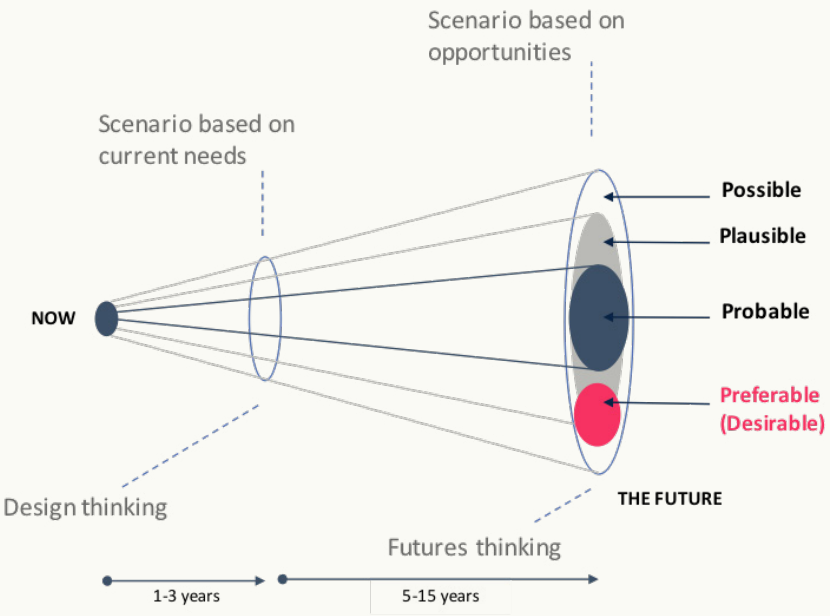


Figure 3. Design and futures thinking scenario transitions along the "future cone" – adapted from Hancock and Bezold (1994)

techniques that inform both the "what?" is changing over the medium to longer-term horizon (5–15 years), and the "how?" this may translate into creative and innovative images and narratives of possible futures.

As design and foresight are growing closer together (Buhring, 2017; Evans, 2012; Hines & Zindato, 2016), a deeper understanding is needed in how designers and interdisciplinary innovation team may apply, and benefit, from systematic futures thinking (approaches, tools, and techniques), and how inter-disciplinary innovation teams may collaborate with overlapping disciplines in framing desirable and shared visions of futures (plural = many possibilities).

6. Key conceptual futures thinking factors

Derived from cross-disciplinary insights, and our own research in design and foresight studies, the hypotheses around the broader role of the strategic design conversation, is to include systematic futures thinking as a transformational approach to producing visions of desirable futures. Resulting from theoretical and applied field research, a series of conceptual "high-level" futures thinking factors were identified:

6.1 Achieving insight and alignment around current reality

Though the future might appear to be the most logical initial emphasis in foresight work, one contribution of strategic design to foresight is to insist on grounding discussions of the future in an immersion in the reality of today, with a focus on both gaining deep and novel insights into today's challenges and customer pain-points, and establishing alignment across critical stakeholders about key elements of the present situation. This aims to accomplish two ends. The first is to facilitate reframing of the initial question, by challenging decision-makers to examine the assumptions they are bringing into the definition of the problem itself. The second is to work towards aligning the views of key stakeholders around critical design criteria that describe the ideal future.

> *Case study example*: In a recent 2030 futures study involving a heterogeneous group of industry experts in the financial services sector (Buhring, 2017), the Delphi method was used as a basis for foresight. In the first Delphi survey round, the objective was to ignite a conversation around the prevailing innovation system, and probe deeper into what defines the current "status quo". Data analysed at the end of this survey round provided important insights as to which products and services are considered as drivers of continues growth. Similarly, the data highlighted that the focus was placed on innovations addressing current customer needs. Due to the diversity of participants in both their backgrounds, perspectives, and experiences, a broad range of opinions were recorded as to what are the signs of change that would have impact on the organization. Hence, establishing what is going on today, and aligning the perspectives across relevant stakeholders in the innovation eco-system, befalls as an important factor in initiating and practicing futures thinking (see Curry & Hodgson, 2008; Morrison & Wilson, 1997).

6.2 Facilitating a productive design conversation

An important goal of the design conversation is emergence: the development of previously unseen *possibilities* that emerge when a group of stakeholders with diverse perspectives is involved in a generative conversation, in contrast to an evaluative one where the starting point is a set of existing identifiable options. In order to accomplish this, the conversation must achieve two things: (1) finding a blend of inquiry and advocacy

and (2) leveraging the diversity within the conversation to produce higher order solutions rather than divisive debates. The two are closely related. The way to turn theoretical diversity into actual creativity is to change the nature of the conversation itself to incorporate an increasing role for dialogue as well as debate, for inquiry as well as advocacy. Participants in such conversations listen to understand rather than argue and listen for possibilities rather than weaknesses. Design thinking's tools for collaborative problem solving can assist the search for higher-order solutions by offering a structured process in which that dialogue and inquiry occurs, and where divergent views are surfaced and explored, rather than relying solely on the skills of the leader of the conversation.

> *Case study example:* Resultant from the aforementioned 2030 futures study (Buhring, 2017), a series of futures scenario statements were produced as consensus toward the Delphi panels' combined vision of preferable or desirable futures. From this research, a subsequent study phase was initiated to expand on the stories and narratives contained in each scenario at a deeper level, thus moving the design conversation from information gathering, to processing the inherent cues for specific potential new futures. A key observation in this study phase was noticed by designers and interdisciplinary innovation practitioners who questioned the dominant business logic, which in context of the traditional financial services business and operating model, was considered in conflict between the embedded present and these imagined futures.

6.3 Specifying a portfolio of desirable futures

Whereas scenario building might tend to focus on possible and plausible futures, design brings a strong emphasis on specifying a set of preferred futures. In this way, its intent lies more with shaping the future than merely responding to it. Like scenario planning, the emphasis is on optionality – specifying a range of different future options. Design also suggests that new futures, in order to become realities, must be *experienced*, rather than merely *thought*: they must be more than cognitive, they must be vivid, personally meaningful, and compelling to the members of the organization who must adopt new behaviours in order to execute them. The idea of experiencing a new future in an emotional as well as cognitive way is grounded in an interpretive, socially constructed

perspective, rather than an objectively rational one. One core dilemmas in moving an organization into a new future, then, is how to make new ideas tangible. Architects build models, product designers construct prototypes – but prototyping a new future is more challenging to envision. This is where design's emphasis on visualization tools like storytelling contribute to foresight work.

> *Case study example:* An enterprise software firm used design thinking to explore and discuss potentially disruptive changes in their industry. The company melded design thinking's emphasis on visualization and storytelling with traditional approaches to strategic foresight in order to compose and communicate new strategies. Carefully constructed prototypes told the story of the strategic imperative they faced at varying levels of detail – from the high-level warning of the potential obsolescence of their core capabilities to the plight of a salesperson responding to a customer's pricing request. From executive dashboard to salesperson's inbox, the connections were illuminated. The prototypes not only engaged; they clarified, allowing people at different level to better understand the specifics of how the new futures impacted their roles and activities.

7. Conclusions

Practicing systematic futures thinking will foster sustainable innovations by detecting early warning signs of change and giving deeper insights into the phenomenon behind these signs. Thus, applying systematic futures thinking could become concrete knowledge and processes for strategic innovation in product and service industries. However, as we have highlighted in this conceptual paper, there is still precious little real understanding in how designers and interdisciplinary innovation practitioners learn to navigate disruption, make sense of complexity, and deal with uncertainty to envisage the medium and longer-term futures (5–15 years) of social and technology environments.

The conceptual approach of "futures thinking" at the front end of innovation, may also offer important considerations that can help overcome weaknesses in the alignment of visions between design and foresight functions applied to innovation, which is the purpose of design thinking and practice. Consequently, we acknowledge the ever-growing need for innovation, design, and foresight stakeholders to work closer

together to both envisage higher order, more innovative and sustainable solutions that will yield the greatest economic and social benefits (Buhring, 2017; Heskett, 2009; Hines & Zindato, 2016; Liedtka, 1998; Meroni, 2008; Slaughter, 2002).

To this end, we have put forward some hypotheses, which suggest that systematic futures thinking activities can offer decision-makers a holistic view on looming issues, and that the role of design (creative thinking, scenario building, visualization, and prototyping competencies), offers a transformational approach to producing tangible images (visions) of preferable and desirable futures. While there are many methods in design and foresight disciplines relevant to opportunity identification, the value of systematic futures thinking is based on the strategic use of producing visions of preferable and desirable futures (scenarios), which can help inform decision-makers of the innovation challenges and opportunities that will emerge over the medium and longer-term time horizon (Buhring, 2017; Buhring & Koskinen, 2017; Kock et al., 2015).

The review of the design and foresight literature, and knowledge gained from our own applied field research, have identified key conceptual futures thinking factors that can assist interdisciplinary innovation stakeholder teams integrate systematic futures thinking at the front end of innovation process. At a conceptual level, the determining factors are based on “current reality”, “design conversations”, and “establishing new futures”, which will enhance the active experimentation and execution stages at the strategic end of innovation.

Jörn Bühring
Research assistant professor,
School of Design,
Hong Kong Polytechnic University, China
joern.buehring@polyu.edu.hk

Jeanne Liedtka
Professor, Darden Graduate School
of Business University of Virginia, USA

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Towards Innovation in Design Education

Reflections on a Vietnamese pilot workshop on Design for Sustainability in Fashion

Trinh Bui, Alba Cappellieri, Ngoc Pham

Abstract

Understanding the environmental, social and economic impacts of the fashion industry can support young designers in facing challenges and grasping opportunities as well as being aware of their responsibilities. Furthermore, by changing to suit the new context, sustainability should be integrated into learning and designing fashion processes. This paper presents a pilot workshop in Design Education that discusses Design for Sustainability (DfS) in the fashion field in Vietnam. With the participation of fashion design students from Fashion Design Department at University of Industrial Fine Arts, they have collaborated with fashion companies and traditional craft villages. The objectives of the trial were: (1) to diffuse and strengthen Design for Sustainability for young designers, (2) to apply design theory into practice with the relevant context of the environment, socio-culture, and economy, (3) to stimulate collaboration between the University/young designers to society and (4) to enhance the role of design education towards sustainability in higher education institutions. The results indicated that the application of DfS in fashion is a promising approach, offering opportunities to work together in order to expand the creative potential and increase cooperation. However, the design education system is in need of proper orientations and long-term collaborations between universities and companies as well as communities. That provides a context in which designers can take on different roles, stimulating innovation in individual and social cognition.

Theme: Innovation
Keywords: fashion, design for sustainability, design education, social innovation, workshop

1. Introduction

Sustainable fashion has become a “megatrend” in recent years among people who concern the global environmental issues. The recent debate how the fashion industry can transfer to a new transformation towards sustainable fashion. This is one of the largest and oldest industries in the world, and this industry is providing employment for millions of people. However, the multi-trillion dollar industry is also becoming one of the most polluting industries (Armstrong, 2015; Joergens, 2006). It is facing

the challenge of using natural resources, discharging into the environment toxic wastes that pollute water, land, and air during production and using processes; overloading of solid waste landfills and outdated fashion products (Vezzoli, 2000; Fletcher, 2010; Niinimaki, 2013).

In order to reduce the adverse impacts of the fashion industry on the environment and society, we should change the way we are doing now, from designing, manufacturing and using processes. People who actively engage in shaping a sustainable fashion industry are designers, the manufacturers as well as customers and users (Fletcher, 2010). The role of the designer has not only mastered designing a sustainable product/service, but it also leverages the diffusion of Sustainability to their stakeholders and their customers. For that reason, raising awareness of sustainability and responsible behaviour among fashion designers, especially young designers/students at design institutions is a necessity to promote and diffuse sustainable fashion to all.

Currently, in high-income countries in Europe and America, the courses related to sustainable fashion have been held; however, in low- and middle-income countries in general and Vietnam in particular, they have not organized training on this field. Even the concept of Design for Sustainability is still a distant concept for all most designers and young designers as well. Thus, one of the important things is that design education should be a pioneer in sufficiently orientated to young designers/designers to gain the new concepts and approaches related to sustainable fashion. As a result, fashion designers might contribute to spreading their knowledge and inspiration to their customers through their own products and services towards Sustainability.

Based on these considerations, this paper aims to study the relationship between fashion and sustainability. In addition, the article provides an overview of the perception of sustainability and the responsibility of designers and businesses in the context of Viet Nam, while emphasizing the importance of cooperation, Design for sustainability in Fashion. To demonstrate this, the article presents a pilot workshop on Designing Education to discuss DfS in the field of fashion in Vietnam. With the participation of fashion design students in Department of Fashion Design, at Hanoi University of Industrial Fine Arts, they have cooperated with fashion companies and traditional craft villages. This project allows us to support a range of a national project, as a part of the Higher Education Reform Agenda (HERA) approved by The Government of Vietnam. The aim of this pilot workshop: (1) to diffuse and strengthen Design for Sus-

tainability for young designers, (2) to apply design theory into practice with the relevant context of the environment, socio-culture, and economy, (3) to stimulate collaboration between the University/young designers to society and (4) to enhance the role of design education towards sustainability in higher education institutions.

After this introduction, the paper is structured as follows: in the second part presents concepts and issues related to Sustainability, Design for Sustainability, and evaluates the importance of design education in fashion. lasting. The third part gives an overview of sustainable fashion and design education in the context of Vietnam. Part four presents the method and process of the workshop. The fifth part presents the results and discusses in benefits and limitations of the study.

2. Understanding Design for Sustainability in Fashion

2.1 What is Sustainability and Design for Sustainability?

The concept of "sustainability" has emerged in the 1970s when environmental and social issues raised concerns about the limited availability of natural resources (Meadows, et al, 1972). In the context of increasing sustainable awareness, sustainability has been seen as a goal of sustainable development (Lunn, et al., 2015). According to the publication of Our Common Future in 1987, the Brundtland Commission defined Sustainable Development as "the kind of development that meets the needs of the present without compromising the ability of future generations to meet their own needs". However, to better understand the meaning of sustainability, this definition should be placed within certain specific contexts, in order to avoid misleading approaches (Redclift, 2006; Manzini, 2008).

By the 1990s, the need for a change toward sustainability was realized, determining sustainability is the balance between three elements: environmental, economic and social as planet, profits, and people (Elkington, 1998). Although this definition has been linked to organizations, "sustainability" is not limited to the three aspects mentioned. Sustainable development is not just a new concept, it is also a new paradigm, thus, this requires a new vision and finds a different way in order to minimize the use of natural resources (Gilding, 2000; Vezzoli, 2002; Manzini, 2006).

Niinimaki (2013) has mentioned the development of holistic thinking and approach on multiple levels in sustainable design rather than narrow approaches such as focusing on the environmental impacts or using eco-

materials. This means that designers need to create and innovate in the design process, producers should have responsibility for manufacturing, as well as consumers should participate in this sustainable transformation.

In the context of the changes, designers and researchers have an important role since nearly 60% to 80% effects of product life cycle are generated at the design phase (UNEP 2004). The concept of "design" is defined by the International Council of Societies of Industrial Designs as "a creative activity aimed at establishing the multi-faceted qualities of objects, processes, services and their systems in whole life cycles". Thus, to minimize the damaging effects on the environment and society, we focus not only on sustainable product design but also on sustainable services. Design for Sustainability (DfS) is emerging as potential and win-win solutions, DfS is defined as "the design process and the resulting product take into account not only environmental concerns but social and economic concerns as well. The DfS criteria are referred to as the three pillars of sustainability – people, profit, and planet" (UNEP 2009, p16). Sustainable principles are embedded in into the Product Design and Product-Service System processes as a key tool minimize their negative impacts (Crul, et al., 2009; Vezzoli, et al, 2014).

At the beginning towards achieving sustainable goals, designers focus on environmental consideration and ethical perspectives as nine points mentioned in Hannover principles as follows:

- Insist on rights of humanity and nature to co-exist;
- Recognize interdependence;
- Respect relationships between spirit and matter;
- Accept responsibility for the consequences of design;
- Create safe objects of long-term value;
- Eliminate the concept of waste;
- Rely on natural energy flows;
- Understand the limitations of design;
- Seek constant improvement by the sharing of knowledge (McDonough, 1992).

More specifically, the European Commission has introduced some common principles of environmentally sustainable design as follows:

- Low-impact materials: designing for use of non-toxic, sustainably-produced or recycled materials which require little or no natural

resources (such as energy and water) to transport and process, and whose use does not threaten bio-diversity;
- Resource efficiency: designing manufacturing processes, services, and products which consume as little natural resources as possible;
- Quality and durability: creating longer-lasting and better-functioning products that last longer, or age in a manner that does not reduce the value of the product, reducing the impact of producing replacements;
- Reuse, recycling, and renewability: designing products that can be reused, recycled or composted after initial use (SEC, 2009).

Additionally, according to European Commission "good design is sustainable design", design can make a big difference and can have several advantages in the context of globalization. It plays an increasingly important role in increasing international competition, bringing more attractive products and services by new properties, values, and characteristics (DesignDenmark, 2007). Commitment to sustainability, therefore, can help designers and producers meet their customer requirements and reduce the environmental burden of products. Furthermore, in some ways, it contributes to raising awareness of customers and users, towards the sustainability and balance of the triple bottom line: environment, society, and economy.

2.2. Design for Sustainability in Fashion

The relationship between fashion and sustainability is traced back since the 1960s when consumers realized the environmental impacts of the fashion industry. The concepts of "eco-fashion", "green fashion", "ethical fashion" or "sustainable fashion" are different names, but to some degrees, they have the same meaning as a part of the "Slow Fashion" movement (Carey & Cervellon, 2014). In the original definitions, the focus was on defining sustainable fashion as being environmentally friendly. It might be eco-friendly and protect the environment, including the principles of fair trade and proper working conditions by using organic cotton (Joergens, 2006). Recently, the trend shows that the shift from clothing and textiles to a broader term which can be defined as clothing, footwear, and fashion accessories, marketed and used in a sustainable manner, in a way deeply concerned about environmental and social aspects (Green Strategy, 2014).

DfS in fashion should be embedded sustainability criteria in all phases: design, manufacture, and use. In other words, sustainable fashion

should take into account the product life cycle, including phases: design, manufacturing, logistics, retail, use, and disposal. However, products should be better able to have more than one life cycle. Niinimaki (2013) argues that from the environmental viewpoint in fashion, a sustainable product might be integrated life cycle thinking as follows:

- First option: to use the product with the originally designed function;
- Second option: to redesign the product after finishing its first life cycle to create a new product;
- Third option: to recycle the materials.

Sustainability perspectives in the fashion industry are closely linked to the whole of fashion system boundaries. In order to apply DfS in Fashion (DfS.F), the shift towards sustainability involves looking at the first stage in the life cycle of fashion products, from raw materials to finished products. Moreover, to some degree, this differs from the different ways in which fashion companies apply DfS play an important role in a sustainable transformation towards social change. The example of the clothing industry shows the diffusion of sustainable programs, and the positive effects of the fashion system due to the efforts of stakeholders and the role of DfS orientation (Bui, et al., 2017).

3. Sustainable Fashion in Vietnamese Design Education context

Basically, fashion design is one of relatively new disciplines in higher education institutions in Vietnam. It is developing in both quantity and quality, but the design program structures are not really complete. An instance in some fashion institutions, there is a lack of clear separation between specialized branches such as apparel and accessories; reasoning and practice in fashion design fields (Bui, 2013). Furthermore, the relationship between theory and practice has a long distance, i.e. the interactive way among designers, producers and consumers might need a more efficiently. As Hirscher and Fuad-Luke (2013) mentioned in their study, new models applying open and participatory fashion design practices challenged the role of designers and partners and designers, producers and consumers.

In the other side, despite rapid growth in exports and employment, but the fashion industry is mainly outsourcing products due to cheap labor.

In the current context of Vietnam, poor working conditions and the ups and downs of unstable demand are leading to a vicious cycle of underdevelopment and low income. Therefore, it should be a shift to upgrading activities, including learning and training to support this area (Tran, 2017).

How can be transformed towards positive, approaching the general trend of the world is the question for the fashion industry in Vietnam in recent years. While the reality shows that the theory and reality of Vietnamese fashion lack the orientation toward sustainable development.

Based on these considerations, this paper investigates applying sustainability into fashion and the response of fashion design students to the concept of sustainability in today's design education. In doing so, it provides new insights into sustainable fashion in Vietnam, enhancing students' awareness of the ecological environment. Together creating sustainable ideas can change the system toward sustainability.

4. Methods

4.1. Objectives

The overall objective of the study is to diffusion and increase awareness of DfS and DfS in fashion for design students, to examine the potential and the practicality of theoretical frameworks. With the focus on the Vietnamese fashion context, the collaboration between universities, companies and craft villages provided a chance working together can support strengthen the role of design education for sustainability and innovation.

To achieve the overall objective mentioned above, this study focuses on the following specific objectives:

- to introduce the concept of DfS and DfS.F, as well as the important role of DfS in the global context, especially in the current context of Vietnam;
- to discuss issues related to sustainability and responsible behavior as well as the role of design;
- to applying theory into the study and design processes, based on the integration of DfS tools and criteria;
- to encourage collaboration between universities, companies and traditional craft villages, with the aim to support fashion design students raising awareness and responsible behavior towards sustainability.

4.2. Participants

In the pilot workshop, 15 undergraduate students took part in, with the support of two academic members from Department of Fashion Design, at Hanoi University of Industrial Fine Arts. The project partners are Gosto Fashion Company and traditional handicraft villages located in Hanoi, including embroidery and weaving villages.

4.3. Process

The pilot workshops are organized in a one-day agenda, with two main activities:

1. Presentations: to introduce the theory of DfS, DfS.F, and case studies in the areas of design to understand models and tools and approaches, including visual presentations by operators.
2. Design activities: to study and create a new design, including researching for pre-design processes, discussing and applying DfS.F in accordance with the current context of cooperation, with the use of design tools and approaches towards a sustainable product and/or service.

The practice part of the workshop included range activities that support the development of the final product/service. In this section, students worked together in groups, each group contains three members. These activities are to study the pre-design phase, create a concept using DfS criteria and visualization and conceptual communication. Finally, each group will present their own presentations to demonstrate the feasibility of applying DfS.F products/services.

Other activities were developed in the workshop as follows:

- to study the theoretical design for sustainability and DfS.F;
- to discuss and reflect among the student groups on the design strategies for sustainability related to the use of local human resources and empowerment;
- to study previous fashion design projects using traditional craft techniques.

5. Results and Discussion

Five groups of fashion students focused on replying the question: how to apply craft techniques, i.e. employ traditional craft village labor into their design? In the meantime, it is important to ensure the aesthetics and functionality of the product. Not only that, each group should find a way to integrate DfS principles and sustainable fashion guidelines into their project.

By approaching the theory of DfS and DfS.F, students discussed sustainable fashion, the criteria, and approaches to the goal – Figure 1. Each group decided and visualize the solution to apply DfS into the design as Table 1 below.

Group number	Technique	Material
Group 1	Weaving	Second-hand clothes
Group 2	Double-sided embroidery	Silk
Group 3	Embroidery on denim	Second-hand denim
Group 4	Quilting	Fabric waste
Group 5	Natural dyeing	Natural silk

Table 1. Using techniques and materials for the project of DfS.F.

After doing research and analysis steps for design concept generation together, and also doing focus group discussion, each student created their own design (clothes or accessories), based on the group discussion results and following design processes.



Figure 1. Design activities in the pilot workshop on September 5th 2017. Fashion design students in Hanoi, Vietnam.

In general, the main purpose of this pilot workshop is to propose a new approach in design education to raise awareness of DfS for young designers, thereby supporting them creating and designing more respon-



Figure 2. An example of a group research step. Group 1. Design activities in the pilot workshop on September 5th 2017.

sible behavior. To achieve this, it is the need to support from stakeholders, especially the collaboration between universities and enterprises, social organizations. Through this workshop, design students were approached and better understand new concepts of sustainability, actively participate in learning by doing. This is the effective learning method in the field of design education. In addition, the learning method learning-by-sharing in DfS to diffuse sustainability is acting as a global learning network (Vezzoli et al, 2010). There are some departments of Design in Vietnam have joined the Learning Network on Sustainability (LeNS) and established LeNS_Vietnam in early 2017. The Design Department at Hanoi University of Industrial Fine Arts is a member of this network. In spite of access to LeNS learning resources; however, without a referral programme and orientation for students, the opportunity to learn from this network is limited to researchers and academic members in universities. Thus, the benefits of this workshop model might open up opportunities for young designers, businesses, and society in order together toward sustainability and innovation.



Figure 3. Group 1 – Weaving dress sketches made by Hiep Luu, Nhi Uong, Quynh Nguyen. Design activities in the pilot workshop on September 5th 2017.



Figures 4–7. Reuse second-hand jeans; multi-function dresses and bags; natural dying sketches made by Anh Ngoc, Thuy Nguyen, Trinh Nguyen, and Huyen Nguyen. Design activities in the pilot workshop on September 5th 2017.

6. Conclusion

> "We can go about building long-lasting environmental and social quality through the design, production and use of fashion and textiles that go beyond traditional ideas or expectations. After all, the challenge of sustainability – that is, of integrating human well-being and natural integrity – is such that we can't go on as before." (Fletcher, 2008)

With activities within the scope of the pilot workshop, DfS and related concepts were introduced to fashion design students. Throughout the

workshop, these students understood the negative environmental and social impacts of the fashion industry, how to approach the tools and methods of DfS.F. After participating in the workshop, design students said that the protection of the ecological environment is important action, they can contribute to the transformation of the fashion industry step-by-step applying DfS to the design processes. This has become one of their inspiration not only from personal needs, but also for the planet and people. Especially in the context of Vietnam, the term of Sustainability is an unfamiliar concept to most young fashion designers and students.

This is a reason why the activities of the pilot workshop mainly focused on fostering and conveying inspiration of the ecological environment to the design students. In this context, the main objective of this study is to demonstrate that this study can contribute to the diffusion of knowledge about DfS, to raise awareness of students about sustainability in order to protect the ecosystem.

As a result, this study suggests that the DfS applied to the fashion area is a potential and win-win approaches, can gain environmental, social and economic benefits. With the cooperation of fashion companies and traditional craft villages, the results of the pilot workshop will continue with the next steps in the near future.

Trinh Bui
PhD student, Politecnico Di Milano, Italy
maitrinh.bui@polimi.it

Alba Cappellieri
Full professor, Politecnico Di Milano, Italy

Ngoc Pham
PhD student, Politecnico Di Milano, Italy

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Social Innovation through Design

A Model for Design Education

Harah Chon, Joselyn Sim

Abstract

Social innovation involves the convergence of human involvement and contemporary society, positioning design practice as a co-creative trajectory towards implementing significant and meaningful change. The social innovation concept has expanded the scope of design's role in society by means of fostering transparency and community involvement to produce contributions extending beyond the individual designer to impact culture and society. This humanistic perspective leads to questions of how design education should adapt and change to enhance the implications of socially conscious design and the designer's position as social leader. Through a discussion of participatory and co-creative design, this paper attempts to identify how design education can respond to social needs through innovative solutions for social change. This paper reviews the experiential processes of design activities through a series of case-studies to evaluate the impact of introducing the social innovation agenda as part of the design curriculum through collaborative and collective projects.

Theme: Innovation
Keywords: design education, social innovation, co-creation, social change, community engagement

1. Introduction

Designers are uniquely positioned to address the challenges and problems affecting society and culture with human-centred, emphatic approaches for the production of models, services and solutions. According to Kong (2000), the making of cultural policy should move beyond the conception of government process and consultancy towards a focus on power, forces of oppression, and the role of everyday places and landscapes in the formation of culture and identity. These implications are reflected in the role that designers assume to intervene and facilitate creativity and connectivity in community life through the production of shared cultural and social activities. Designers are no longer proponents of products and for passive groups of users but catalyses for larger networks and systems to effect change in culture and society (Morelli, 2007).

Singapore has recently allocated and developed creative spaces for environmental, cultural and social sustainability. The concept of social

sustainability suggests that the social dimension of cultural activities allow for increased social inclusion and the forming of community (Kong, 2009). It is against this cultural landscape that social activities forge and cultivate communal involvement, interaction and connection. Designing and integrating socially inclusive spaces and programmes provide sites for social life, fostering shared identity and belonging among the human and non-human actors of local communities. This paper discusses how design contextualises and frames the activities of social innovation projects to contribute to urban place-making and cultural production, informing a new model for socially conscious design education.

2. Design and social innovation

Design functions as a social activity with the way in which many of the products and services proposed for the market fulfil and satisfy human needs (Margolin & Margolin, 2002). As contemporary societies evolve and change, so do the range of existing ways of thinking and doing (Manzini, 2014). The sustainability of cultures and societies relies on designing new processes for achieving socially recognised goals through cooperation and creativity. Central to the effective implementation of social innovation, citizen engagement allows for the inclusion of diverse actors in the processes of developing and sustaining solutions for social issues (Simon & Davies, 2013). Socially responsible design, therefore, requires a shift in perspective for new opportunities to emerge through innovative processes that allow social actors, in varying degrees of social participation, become co-producers and co-designers of the intended social intervention (Morelli, 2007).

Designing for social problems requires shared interests between designers and citizens to improve the social quality and development of communities of practice. Social issues are often characterised by a sense of urgency and complexity, requiring new solutions based on social interactions between people rather than machines (Morelli, 2007). The platforms that designers organise generate planned interactions that are structured around the competencies and roles of various actors. Manzini (2014) outlines the bottom-up approach to design-led processes for social innovation, defining designers as social actors operating with and for communities.

Bottom-up approaches to social innovation and design		
Role	Mode	Skills
Design WITH Communities	Participating as peers through collaboration and creative community building	▪ Collaboration among diverse social actors ▪ Participation in the construction of shared visions/scenarios ▪ Combining existing products and services to support the creative community members
Design FOR Communities	Intervening the contexts of collaborative services to improve and develop replicable solutions	▪ Conceptualise and develop solutions for specific collaborative services and other enabling artifacts

Table 1. Social Innovation and Design within Creative Communities (Adapted from Manzini, 2014)

Designing *with* and *for* communities require designers to clearly take the stance of *participating with* or *intervening for* the immediate social issue or community of interest. The positioning of the design's role allows for clear methodologies to take shape, as presented in the following example. Margolin and Margolin's (2002) model for social design draws from the collaborative, six-step problem-solving process of social workers to meet the needs of client systems through design interventions.

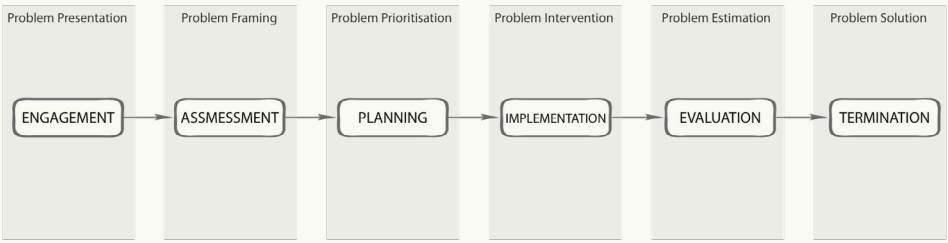


Figure 1. Social Design Process (Adapted from Margolin & Margolin, 2002)

The six-step process of engagement, assessment, planning, implementation, evaluation, and termination can be further explicated as an holistic problem-solving process for socially conscious design. By first identifying the community or group of social actors, the problem can be identified and the constraints of shared activities and potential design solutions

can be collectively determined. The procedural steps of this methodology will be further explored and discussed in the next series of case-study examples.

3. Case-studies

Social innovation involves a process of change that aims to achieve socially-recognised goals in new ways (Manzini, 2014), evidenced by the concept of integrated citizenry in Singapore's initial proposals for the development of public housing. The migration of low-income households from *kampong* (villages) to public housing estates was driven by postwar, political motivations emerging from a need for societal change in the imagined nation-state of Singapore (Loh, 2009). Public housing estates were designed to improve living environments with provisions of open spaces, communal gardens and recreational facilities. The following two case-studies present how emerging issues and needs were identified in public housing estates to illustrate the key role of design to influence and impact local communities.

3.1 Case-Study I – "Singapore's Melting Pot of Curry: A Study in Developing Participatory Design-led Social Integration Initiative"

(CHUA JIA XIANG, LASALLE COLLEGE OF THE ARTS, 2014)

This project was developed in response to news reports indicating that a significant number of Singaporeans were discontent due to the mass influx of immigrants who were taking over blue-collar jobs and overcrowding the public transport systems, thus resulting in negative tensions between Singaporeans and the growing community of migrant workers. Yahoo Singapore conducted a poll in May of 2012 with migrant workers, indicating that Singaporeans were increasingly becoming xenophobic (Teo, 2012). Further tensions were noted with the discontent of Singaporeans in response to the breakdown of the transportation infrastructure due to the inability to support the sudden increase of usage (Tan, 2012) and the overcrowding issues found in public housing estates (Toh, 2013). Against this backdrop of social issues, organisations such as Humanitarian Organisation for Migration Economics (HOME) and National Youth Council began experimenting with participatory design approaches to address challenges to build and promote social cohesion.

The growing tension between locals and migrants posed new social challenges that developed into a growing concern for Singapore. Despite the launch of awareness initiatives by the government, the lacking sense of community and empathy between the two groups complicated the integration process. This research proposed to empower designers to seek new processes to enable active participation with the two stakeholder groups through social cohesion initiatives. Aided by the designer as researcher, the project experimented with different participatory design tools and techniques within an inclusive process to build more ownership over the collaborative efforts and outcomes.

The research aim was to consider possible guidelines for the employment of design-led social initiatives, such as participatory design, to better address the issues concerning social cohesion. The following methodology maps how the project was initiated, developed and carried out.

Singapore's melting pot of curry:
A Study in Developing Participatory Design-led Social Integration Initiative

Stage	Insights
STAGE A Understanding the Cause of Social Separation and Lack of Interaction Opportunity	Questionnaires were used to gather an overall sentiment from the two stakeholder groups Interviews were conducted to gain an in-depth understanding from design professionals and social activists on the challenges, opportunities and feasible techniques arising from the use of participatory design in Singapore
STAGE B The Need in Developing a More Accepting Society of Foreign Migrants and their Cultures	Singapore has always focused on the national, multiracial, societal model of a community consisting of Chinese, Malay and Indian communities (Vasu, 2012).. This model of Chinese, Malay, Indian and Other (CMIO) has been implemented across all national policies from public housing planning to education. In recent years, this model has begun to face problems with the surge of new migrants from relatively different cultures. With the ever-increasing new migrants, many were forced to fit into the "Other" model. Vasu (2012) described that the model subconsciously created "us" versus a very different "them", heightening the difficulties to bond.
STAGE C The Guideline in Developing Participatory Design-led Social Integration in Singapore	In an interview with K.K. Ong, he mentioned that designers should "actively involve all stakeholders in the design process in order to help ensure that the solution meets their needs and is usable." By supporting people-centric processes, the proposed solutions are given a better chance for success as they address challenges from all relevant perspectives for all involved stakeholders.

Table 2. Research Methodology for Participatory Design

Participatory design was successfully executed by encouraging both locals and migrants to raise awareness of the issues surrounding their communities and cultures. The 'Vertical Kampong' app (Figure 2) was created to reflect participatory design approaches from the ground up. Through the app, Singaporean users were able to create or partake in a variety of activities connecting local neighbours to initiate the integration of activities with the migrant community.

Challenges faced by participatory design practitioners concern how to connect participants through localising techniques and tools to maintain participant interest. Building the steps for participatory design approaches allows designers to develop and fine-tune social initiatives that help create empathy and foster relationships. An example of this is found



Figure 2. The Vertical Kampong Application



Figure 3A. The Vertical Kampong Application (Let's Makan Together)

in “Let’s Makan Together”, within the Vertical Kampong App (Figure 3A), which integrates social media to encourage community gatherings through the sharing of meals. Another community initiative, “Our Rojak Cookbook” (Figure 3B) built user generated content exchanges to become one of the tools to help foreign residents integrate into the community by connecting users based on food preferences and hometown recipes.

In interviews with Ms. Mizah Rahman, Ms. Jan Lim and Mr. Adrian Tan, all of whom are key players of participatory design in Singapore, they collectively felt that the issue of local-migrant tensions was too complex to solve immediately with participatory design-led approaches. However, participatory design-led social initiatives could be used as an *“opportunity to creatively engage in an effective dialogue with people.”*



Figure 3B. The Vertical Kampong Application Our Rojak Cookbook



Figure 4. The Vertical Kampong Application (Kampong Leader)

This is reflected in the Vertical Kampong Application, which initiated conversations between community members.

The Vertical Kampong app was further developed as a design solution that address challenges from relevant perspectives to sustain and increase usage. A 4-step process of participation was integrated within the app:

Vertical Kampong 4-step process of participation			
Welcome	Integration	Sharing	Bonding
Users are introduced to the app and able to explore, read and sign up to join the community.	Allows Singaporean users to take initiative in leading the community and rise up through a ranking system within the app to become a "block chief" (Figure 5), gaining the respect of fellow neighbours. The block chief will create activities and events to encourage participation from old and new residents.	Content from activities are posted for everyone, thus encouraging more residents to partake or join future events within the thriving community.	Occurs when everyone is actively using the app and the ensuing recommendations are made to family and friends.

Table 3. Participatory Design Process

When evaluating the execution and implementation of this project, a key factor for success was found in the passion-driven, sustainable initiatives that served as incentives for participants. Mr Liam Yeo, a strategic planner, voiced that *"participants know what they need better [than] having a designer or planner to dictate it...participatory design has to be able to create a continuous ecosystem for an initiative to run by participants for participants."*

3.2 Case-Study II – "Communicating with 21st Century Spaces: Enhancing the Communicating between Void Decks and Users through Technology"

(MUHAMMAD HEIDER BIN ISMAIL, LASALLE COLLEGE OF THE ARTS, 2015)

This project involved the examination of publicly shared spaces and community engagement in Singapore's public housing estates. Urban

planners, during the early years of Singapore's independence, conducted a massive relocation of the population from low-rise estates into high-rise apartments. This has resulted in the creation of high-density, residential areas with over 80% of the population residing in public housing (Lee Kuan Yew School of Public Policy, 2014). Introduced in the 1960s, public housing estates established by Singapore's Housing Board Development (HDB) have become a symbolic form of Singapore's unique identity. Public housing estates have inadvertently promoted collectivism and racial harmony for multiracial communities through use of public spaces and marketplaces, encouraging the organisation of shared activities and community engagement.

The concept of a *void deck* is a vacant communal space located on the ground floor of all public housing estates. This communal space is used on a daily basis as part of the commuting route from the private home to the domain of public spaces within the neighbourhood. The main layout of the void deck is typically vacant and replicates the play areas found in the early villages of Singapore, known as 'kampongs'. Although void deck culture is deemed a national past time, as an integrated space for residents to congregate, it is currently facing the threat of decline due to various social issues.

This research examined how the void decks began losing significance as communal, activity spaces and were increasing in use as transitional spaces. The project was developed to enhance social interaction by repurposing the void decks through technology. Primary research was gathered through intensive interview sessions with various groups and communities within the public housing estates, including the documentation of two families to better understand their experiences within and around the neighbourhood. Interviews were also conducted with architects, urban planners and government bodies to provide further information as well as awareness around the issue of empty void decks. Additionally, interactive designers were interviewed to discuss whether co-creative approaches can effectively provide an appropriate response or solution to the problem.

Field studies were conducted in two locations: (1) Jalan Kukoh Estate, a mature residential area with a high proportion of low income families, and (2) Compassvale Estate, a residential area with a high proportion of middle income families.

Research highlighted that void decks act as both a transitional space and a location for holding official events. However, void decks are slowly disappearing in new estate designs. In an interview with Mr Johnny Lim,

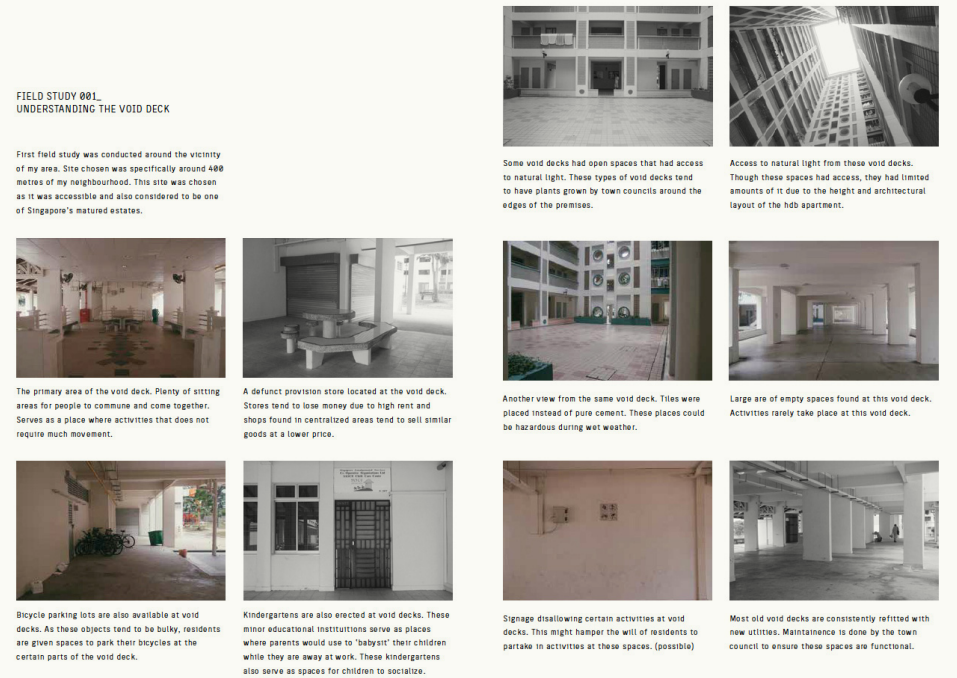


Figure 5. Architectural layout of void decks

a Grassroots Committee Leader from Sengkang East GRC, he raised the importance of preserving Singapore's kampong spirit and his own awareness of the decline in void deck culture:

> "We don't see people doing things at the void deck nowadays. Even official events are moved to the multi-purpose hall. The void decks are too squeezy to do anything and they only serve as walkways to get from one point to another. I guess [that's] why people don't talk that much anymore."

Visual observations were conducted to better understand the users of technology, indicating that Jalan Kukoh Estate had a significantly higher volume of public space activity than Compassvale. To better understand this discrepancy, a Jalan Kukoh resident, Jamal Salleh, was interviewed:

> "Most of us have no money so we don't really buy electronic gadgets. I will usually let my children play around the neighbourhood because it is safe. As much as this place is a poor estate, it is still safe

for my children because this place is like a kampong. We watch out for one another over here. In Malay, they call it, 'bergotong-royong.'"

In contrast, a resident in Compassvale provided insight on his children and why they rarely spend time in void decks due to his preference to integrate technology as tools for engagement. Various technological devices have allowed him to effectively interact with his children and he highlighted the benefits of how such devices can be used to 'distract' them when busy.

The following stages provide the methodology for setting the key parameters of the design project.

Communication with 21st century spaces:
Enhancing the Communication between Void Decks and users through Technology

Stage	Insights
STAGE A Observing the Differences between Void Decks and other Forms of Communal Spaces	Unlike playgrounds and street soccer courts, 'void decks' are a unique form of communal space laid vacant so that countless forms of official and unofficial activities can take place. The empty space allows neighbours to conduct unofficial activities that could foster social bonding, helping to reduce communal divides and enhance racial cohesion as part of creating a sense of identity for Singaporeans.
STAGE B Find out how Technology can Benefit Families Living in the Selected Estates	Digitag was developed, integrating intuitive technology to engage residents in an interactive kampong experience.
STAGE C Importance of Intuitive Design and Co-Creation as a Form of Better Interaction amongst Communal Spaces and Users	Communal spaces, as a form of place-making, allow socialisation between users. The possibilities of assisted interactions through technology were explored within the context of the void decks, as intuitive environments become possible with the aid of technology.

Table 4. Research Methodology for Co-Creation in Design

Spaces can become interactive as users learn to connect and communicate with the surrounding environment. Research uncovered that emerging technologies have raised the ability to enhance environments, making them function through co-creation. Technology can encourage forms of co-creation between neighbours and spaces to establish a more dynamic concept and use for void decks. The implications for design were



Figure 6. Digitag

to use technology to enhance the interaction between the void deck space and users, normalising the presence of technological devices to address the decline of physical activities.

Digitag was created as an idea centred around utilising touch sensors, inviting users to spray graffiti on the walls of the void deck. Users were able to shape individual actions within the system, leaving a unique trace to form interactions to transform space into a sense of place. The project revealed how a designer can create possibilities for novel interactions and activities, inspired by being sensitive to co-creation as a collective process.

An interview with interaction artist, Pabo Valbuena, provided the following insight:

> *The most important issue is how the space is designed, how it is circulated, which architectural elements are present that help to experience the space in a certain way, etc...I am sure there are interesting ways to use technology to improve spaces that already allow good communal communication, I don't think though that technology can balance a space that already clutters that communication.*

Although void decks are gradually decreasing in presence and its role as an important social space will continue to decline, the current technology available to endorse co-creation has the ability to reform and repurpose void decks through increased interactions between residents. Technology can be utilised as a mechanism to build social innovations by empowering users within constrained living environments. The research on void decks showed that users positively responded to the implementation of technology-driven activities and interventions.

3.3 Discussion

The two case-studies address the dynamic social issues within the public housing estates of Singapore, emphasising the role of design and designers to intervene and provide solutions for more inclusive communities. Socially responsible design requires the designer, as researcher, to identify with and understand the underlying social problems before embarking on a process for change. Taking from Manzini's (2014) bottom-up approaches for social innovation and design, the shared motivations between the two case-studies are further discussed.

Case-Study I has revealed issues of social cohesion that are, fundamentally, issues of social inaction. Through the grassroots-level interactions and engagement, the study uncovered layers of issues that kept this inaction unaddressed. There is a need for solutions that allow for cultural exchange to develop shared motivations and a common identity that reflects the social realities between locals and migrants. With respect to deploying participatory design approaches for social innovation, the success and effectiveness of the approach requires platforms to be proactively inclusive and accessible to all groups. The effectiveness of the project is seen in the ability to help social initiatives grow intuitively through self-initiated community bonding and content sharing.

According to Sanders and Stappers (2008), the concept of co-creation developed from the convergence of user-centred and participatory design approaches. Co-creation involves the collective creativity of users and moves beyond participation to develop into a design language encouraging the explorations, expressions and experiences of everyday people (Sanders, 2005). One important factor uncovered by Case-Study II was identifying the role of technology to strengthen co-creation among residents. The research advocated for more emphasis on technology to endorse socialising activities to reintroduce the original purposes of the void decks as a shared, communal space.

The two case-studies reveal a common theme in the re-appropriation of space through creative place-making. The sense of place produces conceptions of history, nostalgia and heritage, all of which are embodied through individual interpretations, social constructions and political uses (Yeoh & Kong, 1996). Places are representative sites for the symbolic expression of individual and collective sentiments, wherein design is emphatically positioned to reintroduce the significance of deepening human interactions through use of technology in participatory design and co-creation.

Insights on participatory design	
Stage	Description
Identify Challenges of Developing Participatory Design-led Social Initiatives	Regardless of how promising participatory design can be, designers need an awareness of the challenges for developing such design-led approaches in Singapore to prevent the failure of social integration initiatives. It is important to identify and discover sustainable approaches for social initiatives to encourage successful participation from stakeholders.
Sustainability of Participatory Design-led Social Innovation	In order to retain stakeholders for active participation in socially-led integration activities, designers must consider the growth of social technologies that encourage participation in real-time to allow the social initiatives to effectively co-create. Designers also need to explore different ways to retain the interests of the stakeholders and ensure the growth of initiatives.
Creating Social Integration Initiatives	Many social issues involve layers of complexity that are difficult to solve with participatory design-led approaches. Design is, however, able to strategically implement creative approaches to initiate awareness and dialogues between stakeholders.

Table 5. Stages of Participatory Design

Insights on co-creation	
Stage	Description
Conceptualisation of the Co-Creative Dimensions	Designers need to fully understand the circumstances surrounding the main problem and identify the potential participants. Initial research through interviews, surveys and observational studies allow the designer to contextualise the social issue.
Development and Refinement of the Co-Creative Framework	Designers need to fully brief and prepare participants in order for active engagement and interactions to take place. An examination of best practises and successful case-studies is essential to the successful implementation of a co-creative process.
Application of Co-Creative Activity	Participants and stakeholders need to understand the underlying motivations and values of the co-creative activity in order for the efforts to be effectively realised. Design is strategically positioned to facilitate co-creation by ensuring that all involved actors are able to engage and contribute to build a stronger sense of community and membership.

Table 6. Stages of Co-Creation in Design

4. Implications for design education

There has recently been a growing awareness and need for more humanistic and ethical approaches to design practise. Design has developed its own strategies to influence and affect user behaviour in consideration of the intended interactions and social implications (Tromp, *et al.*, 2011). Designers are not mere facilitators of socially conscious design activities but are adept at eliciting the necessary emotions to induce behavioural responses and effectively influence social interventions.

The call for building a socially conscious design curriculum stems from the case-studies of student-led, socially inclusive design research and is further supported by design literature on existing social innovation models. Design students are increasingly aware of the social issues requiring empathetic and ethical perspectives to produce socially responsible and sustainable outcomes. The two case-studies addressed how design can strategically enable citizen engagement by understanding community needs and co-developing solutions to address the issues. According to Simon and Davies (2013), citizen engagement is critical to promoting social inclusion and creative innovations. Designers can prescribe the necessary methods, processes and activities to mediate and facilitate citizen engagement through design interventions (Manzini, 2014).

Referenced against the Social Design Process (Figure 1), the insights and themes arising from the two case-studied were summarised and explicated to produce a model for social innovation (Figure 7). According to Margolin and Margolin (2002), social design requires students to relate directly to vulnerable and marginalised populations to understand the impending social needs. This requires interdisciplinary collaborations between groups of students, policy makers, professionals and stakeholders to effectively advance the socially responsible design agenda. The fol-

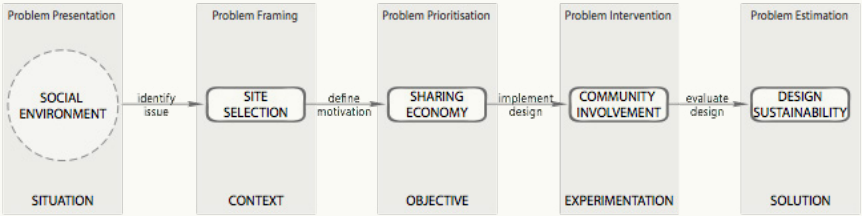


Figure 7. Process Model for Social Innovation in Design Education

lowing process model outlines a general framework for how social design projects can be introduced in the undergraduate design curriculum.

Developing a social innovation model for design education requires consideration for outlining a manageable project scope, setting appropriate objectives, introducing feasible design interventions and defining clear measures for solution effectiveness. The social design process outlined by Margolin and Margolin (2002) included a final sixth step, *termination*, during which point the project is finalised and accepted as a successful case. This step is eliminated in the above model, as social design cannot be planned according to its relevance or lifecycle but should be able to produce self-sustaining solutions once adopted and adapted by the community of users.

As seen from the two case-study examples, there is growing sentiment in Singapore to position socially conscious designers and utilise strategically inclusive design processes to address many of the disregarded social inequalities and issues. This requires social design practise and education to recognise the importance of place and creative place-making by integrating histories, nostalgic emotions and cultural heritages. This paper posits that human interactions allowing for individual and collective interpretations and constructions are necessary to the successful implementation of social design.

5. Conclusion

Cultural activities, through increased social inclusion, positively respond to the challenges of achieving and maintaining social sustainability in Singapore. This paper has addressed how social life in residential communities is declining as the urban landscape continues to develop, positioning design as a significant actor and contributor to urban place-making through cultural production. The two case-studies illustrate how design students were able to heighten their awareness of social issues and empathise with the stakeholders to undertake research involving real issues, people, collaborations, interactions and solutions. This has led to the development of a process model for social innovation in design education, which maps a methodology for how future design students can feasibly frame, understand and implement social design initiatives.

This paper has addressed gaps in social design models for education that are culture-specific to the region of Singapore and Southeast Asia. Future studies can broaden the scope of examples and on-going endeav-

ours to better understand how design can further collaborate with non-governmental organisations (NGOs) and various social research groups to build a more comprehensive framework informing socially responsible and sustainable design processes.

Harah Chon
Artist-in-Residence, Faculty of Design,
Lasalle College of the Arts, Singapore
harah.chon@lasalle.edu.sg

Joselyn Sim
Lecturer, Faculty of Design,
Lasalle College of the Arts, Singapore,
joselyn.sim@lasalle.edu.sg

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Hear the Other, Design Together

Urban Interiors as Innovative Pedagogies in Contemporary Design Education

Emine Gorgul

Abstract

In the last decades, due to the shifting mechanisms of production, consumption and the lifestyles, we observe increasing debates on re-questioning the current urban condition and the public space. However, transfiguring condition of the modern city, especially the presence of public space in the urban realm have been long debated discussions of the late 20th and early 21st centuries. Yet, the increasing impact of interdisciplinary collaborations further paves the way for the creation of innovative attempts and implementations about the urban realm in terms of re-activating and designing the urban rooms. In this respect, on behalf of creating peaceful environments and temporal atmospheres of democratic urban spaces, in other words common milieus of existences, where the citizens get together, the notion of urban interiors emerges as a novel design strategy and a pedagogical approach that investigates diverse potentials of the urban domain. Departing from these facts, this paper conveys the theoretical back ground and the pedagogical exercises on urban interiors that are carried in ITU School of Architecture, while opening them into a broader discussion in terms of generating a broader knowledge and pedagogical innovations together.

Theme: Innovation
Keywords: urban interiors, innovative studio pedagogies, interdisciplinary aspect in design education, interior design education

1. Introduction: Condition of the Public Sphere

Beginning with the second decade of the new millennium, we observe the increasing debates on re-questioning the current condition in the modern city, particularly the presence of *public space*, how it has been lost and found again in the theoretical and practical discussions (Urbonas et. al, 2017). In fact, the emergence of the public sphere has been a long argue in relation to the advent of the modern society, initially with shifting powers of state and capital, then with Industrialization and Enlightenment, and later with gathering the 'other' and the 'every' aspect of the daily life.

As it is known, with his neo-Marxist reading Tafuri unfolds the development of the early capitalist society and the rise of the modern city, by drawing back his argumentation to the Late-Medieval era (Tafuri, 1976). Similar to Tafuri's essential remarks, Kwinter also highlights the spatial

existence of the trade rhetoric and the daily routines, as well as the specialization of time in the European cities through the market places and the city squares, where the power of the state, religion and finally the capital materialize within the public sphere (Kwinter, 2002). Although they discuss the rise of the capitalist structures and their penetrations into the urban realm and the society, Simmel appears as another remarkable figure that examines the macro and micro relations of the Industrial turn, via dismantling the interconnection between the industrialized modern metropolis, public sphere and the individual psyche in the modern society. As it is acknowledged, Simmel reflects the strongest critics to the rise of modern life in the urban realm and the birth of the metropolitan individual that at first releases from its socio-cultural and economic ties, but then being trapped with the metropolitan psyche, which in fact transforms the individual and the public sphere through loosening bonds and interactions between the individuals. Like Simmel argues, this further paves the way to estrangement of the individuals to the milieu – the environment and the society – that they exist (Simmel, 1903). So, they recessed into their protective clusters – the *interiors* – from the "fluctuations and discontinuities of the external milieu threaten [them]" (Simmel, 1903:12). Although Simmel discusses this transition in the mental level; instead, referring to Foucault, Vidler opens the similar case into discussion through resonating with stratification of the society and the urban realm that further leads to segregation in between the classes and ceases the togetherness of the society in terms of social control. (Vidler, 1993). So, Vidler argues that, this split between the social classes and their positioning through diverse milieus of existences in the city, in fact stems from not only the relations of capital and intellectual specialties of the citizens (Simmel, 1903:13), but also from the power relations, which causes the fragmentation of the public sphere (Vidler,1993).

Besides, by winding back the discussions to the Enlightenment, Habermas also emphasizes the rise of the democratic public sphere via introducing his essential notion Öffentlichkeit (Habermas, 1989). Habermas highlights the growth of intellectual capital in the modern urban realm, so that the logic and "rational discussion takes place between citizens on matter of general interest", whereas the public opinion rises from these formal or informal debates, and their influential capacity in organizing the society (Avermaete, 2014:30). Avermaete also marks the emergence of these new capital holders that give way to the formation of novel milieus and interfaces of gathering and meeting in the public

sphere. So, the appearance of these new members of the modern society, or like Habermas refers the educated bourgeois class of doctors, lawyers and scholars, in a way expanded the "new public spaces into salons, cafes and clubs, where members of different classes met to engage in debate, verbal sparring, and display of rhetorical sophistication" (Avermaete, 2014:31). In addition, increasing importance of freedom of expression, further challenges the birth of numerous mediums such as newspapers, books, periodicals, etc. that are coming up as novel intangible actors of the public sphere. (Avermaete, 2014).

In negation to Habermas, philosophers like Negt and Kluge also emphasize the essence of the *counter* – the *other* – through expanding the public sphere beyond the bourgeois cycle (Negt and Kluge, 1993). Negt and Kluge state the dynamic structure of the public life, and imply the constant emergence of new forms and means of public sphere that is always heterogeneous and not to be assigned into a single class or group (Negt and Kluge, 1993). Yet, resonating with Negt and Kluge, Fraser's critics against Habermas are also crucial. By highlighting the existence of the other varying member of the society, Fraser draws attention to the importance of embracing them, who are in fact discarded and segregated from the sterile urban life due to their gender, race or status (Fraser, 1992: 123). Moreover, resonating with these oppositions, Arendt appears as another critical figure, who re-introduces the political dimension of the public sphere through the self-realization process of the individual by claiming the public realm as the *spaces of the appearances*. Unakin to the labor and space interaction of the late-capitalist society, Arendt stresses that public realm is the place where people act, rather than work. According to Arendt, only through this action and speech people can create a spatiality in-between each other, and this is the place like she states "I appear to the other and the other appear to me" (Arendt, 1958:198). What is more interesting in Arendt's discussions is also the emphasis that she draws up on, not only the gathering and interaction between the individuals in the public sphere, but also the broader integration of all "other living and inanimate things" that come together to make this wider sphere as the public realm. Arendt also undermines the importance of visibility and accessibility of everything and each one as the basics of the democracy in the public realm, and fostering the commonality (Avermaete, 2014:35).

In fact, communality is the key aspect in the slight, but the crucial distinction between the notions of *public space* and the *common space*, whereas the latter enfolds the democratic essence that plays the active

role in self-realization of the individual being provided an inclusion of this collectivity that it emerges. This further avoids the individual being "remained suspended [with]in its own individuality" (Avermaete, 2014:35). In this respect, while tracing back the hints of the communality in the modern public realm, Paris Commune in late 19th century Paris, or in May '68 Events as well as the existence of Kommune 1 in Berlin in 1967 have been the cases that re-assures the democratic common space and the transfiguring potential of the collectivity of the communal-individuality.

Furthermore, while contributing to the heterogeneous multiplicity of the social structure, Sennett also discusses the importance of creating zones of *social frictions* in the public realm to foster the interactions between the individuals (Sennett, 1992a:196). Sennett also defines this as the communication between the strangers that creates the new social conventions in urban realm, which he addresses as *civicness* (Sennett, 1992b).

2. Rise of Urban Interiority and Designing the Public Rooms

By all means, both the evolution of the modern society and the public sphere have been gradual processes with back and forth. Yet, in the integration of the modern individual with the city and the public sphere, we observe the emergence of *urban rooms* – inhabitability of the urban sphere – through creating *intimacy* in relation to the notion of belonging. In this respect, by introducing his ground-breaking notion *flâneur* in hisseminal "Arcades" project, Benjamin emerges as the leading figure, who frames the pattern of this merely dynamic or atomized belonging of the modern individual, who inhabits within the public space and may dwell into it at any time. Like he mentions "The street becomes a dwelling for the flâneur; he is as much at home among the facades of houses as a citizen is in his four walls.... The walls are the desk against which he presses his notebooks; news-stands are his libraries and the terraces of cafés are the balconies from which he looks down on his household after his work is done..." (Benjamin, 1938).

On the other hand, beyond the conceptual habitational capacities of the urban niches, in the contemporary theory and praxis we observe a recent focus that investigates further contributions of interdisciplinary collaborations in terms of activating and designing these urban rooms through focusing on the enhancement of the individual's integration with the milieu that it exists. Like Montanari discusses the current design

strategies and tactics of the new millennia for the metropolises are seeking to re-occupy the city centre that once being abandoned during the late-modern era, in relation to the – physical – growth of the of the cities and loosening bonds between the centre and the periphery due to the transformation in lifestyle and socio-economical order (Montanari, 2014). In addition, the impact of informatics and the increasing capacities of televisive technologies, as well as the means of remote communication are also affirmative implementations that strengthening the divergence of centre and periphery duality. Montanari also claims that "a sequence of economical, demographic and socio-cultural phenomena began to deeply modify structure, use and sense" of the urban spaces during the 20th century so that the meanings and activities of the cities were drastically reduced (Montanari, 2014: 76). In this respect the "disaffection and gradual abandonment of the rooms of the city" have been sharpened with the introvert life of the late 20th century individuals' dependency to indoor activities of consumption, entertainment, etc. (Montanari, 2014: 76). Thus, the left-over, non-place urban rooms emerge as potential nodes of *civicness* to re-populate urban friction and enhance the collectivity between the distanced non-communicating individuals within the city.

In relation to this inquiry, during the last decades, independent but similar interventions are observed, with a desire to enhance the urban atmosphere via elaborating with the intense synergies through interior design principles and instruments. In other words, the re-qualification processes of the rooms of the city keenly focuses on increasing the overall quality of the place, "coherently fulfil both functional and formal tasks, as well as enhance representation issues, foster social and cultural attractiveness, identify and fulfil individual and collective needs and/or behaviours" of the citizens (Montanari, 2014:78).

In this sense, the notion of urban interiority emerges as an innovative approach and practice to design the current relations of the contemporary citizen with its milieus of existence with the tools of interior architecture primarily, while creating peaceful environments and temporal atmospheres of democratic urban spaces as its benefit. Thus, ephemeral understanding of existential qualities via enhancing the atmospheric variations of *belonging*, *being now and there*, as well as *intimacy* and other *sensorial mechanisms* become essential in the creation of these novel rooms of the city. So, the public space is no longer an afforded nor the privileged urban space of a group of people, but truly becomes a common space that gathers every member of the city even embracing

the non-human all components of organic and inorganic subjectivities like Arendt mentions, material and immaterial domains operating through mutual subjectivity or transitiveness of the subjet-object duality.

On this point, like Hinkel argues, the notion of urban interiority appears to be "located at the *thresholds* between the *interior*, habitually conceived as the *private realm*, and the *urban* or what is generally recognized as to be the *public realm*" (Hinkel, 2011: 6). In terms of intermingling inside and outside relations and the notion of intimacy, Hinkel also emphasizes that "[t]he space between the urban and the interior is one that continues to unfurl, requiring that one interrogates the productive interplay at the threshold, where it is not possible to say whether one occupies a realm of privacy or publicity, a space on the inside or outside, a collective or individual moment" (Hinkel, 2011: 7). In fact, when examined etymologically the initial use of the word interior corresponds around late 15th century French word *intérieur* that is transformed from a Latin originated word *interus*, meaning intimacy and privacy (URL 1).

Yet, in relation to intimacy and privacy, as well as Hinkel's argument about thresholds, the conception of *door* plays an essential role in the formation of these perceptions. Like Stonner discusses by referring to Indo-English linguistic root of the word the term door derives from the old English word *dhwer*, which is developed from the term forest in original, in the meaning of non-domestic, while defining the things unbelonging to the home, but the outside, to the wild, to the forest (Stonner, 2012). In this respect the *doorway* – the pathway leading from the house to the outside, to the forest, to the un-controllable wild – emerges as a real threshold that regulates these diverse intensities of the territorialized inside and the de-territorialized and unpredictable outside (Stonner, 2012).

Besides, again in relation to the notion of belonging Pimlott undermines the territorial conditions of the controlled and the uncontrollable, as well as the opposing relations of insider and outsider by introducing the concept of *arcady* in Ancient Greek pagan customs, whereas the Pan – the uncontrollable outsider – lives in the outer territories. Pimlott also mentions that the meaning of word panic derives from; the unpredictable many diverse things from the outer world (Pimlott, 2014:89–90). This is in fact the reason of why the notion *polis* is conceptualized in Ancient Greek, to create the controlled, orderly structures of the territorialized and homogenized public realm, the autonomous city inside the citadel, the interior against the uncontrolled, unpredictable, unsafe outside. Moreover, this notion of belonging is the essence and the invisible struc-

ture of the polis rather than its physical surroundedness. Like Arendt explains "it is the organization of people as it arises out of acting and speaking together, and its true space lies in between people living together, and its true spaces lies between people living together for this purpose, no matter where they happen to be." (URL 2) (Arendt, 1958: 198). In short, the notion of polis is an immaterial body of a socio-political structure, that begets the understanding of citizenship, so that the citizen emerges within this structure as the insider, who belongs to this relatively temporal territorial condition. On the other hand, in the light of Deleuzian terms *territorialization*, *de-territorialization*, and *re-territorialization* process of the milieus of existence either in physical, or in any other mechanisms of existences; similarly, Arendt also highlights the critical capacity of polis as a tool in territorialization trilogy of existence in the colonial mechanisms (Arendt, 1958: 198). So, referring to the motto "wherever you go, you will be a polis" Arendt re-emphasizes the temporality and inter-changeability of this dynamic territorializing and belonging processes in the frame of polis-as the spaces of appearances (Arendt, 1958: 198).

Indisputably, this belonging of the citizen is an awareness of interiorization of belonging to the unity or communality, where it exists and forms. In other words, this is an in-formation process of the belonging through invisible, intangible structures of cognitive processes. However, we can also argue the intimacy and belonging of the territorial condition in relation to the notion of atmosphere. In this regard, Banham's definition of *camp-fire* as an intangible-temporal milieu of gathering that refers to the capacities of micro-climate to generate neither a physical, nor political, nor colonial interiority. So, Banham explains that, the fire that is set by lighting up three or four wooden beams, unlike rising them up as a construction; creates a temporal, but informal and liberating diversity, variation and multiplicity via producing a novel architecture, which is totally different than a conventional understanding (Banham, 1965). On the other hand, referring to Banham, Hight et al. (2009) also discuss the heterogeneous interiority that the camp-fire carries, due to changing intensities of light and heath of the atmosphere. Hight et al. (2009) describe the interchangeable mechanisms of Banham's vague bounded immaterial interiority as follows, "the output of heat and light from a campfire is effectively zoned in concentric rings, brightness and hottest close to fire, coolest and darkest away form it, so that sleeping is an outer ring activity, and pursuits requiring vision belong to the inner rings. But at the same

time, the distribution of heat is biased by the wind, and the trail of smoke renders the downwind side of the fire unappetizing, so that the concentric zoning is interrupted by other considerations of comfort or need."

So, in each reading of interiority, we confront with similar understanding of anchoring, temporal territorialization of the milieu, belonging and communality, interiorization of this democratic involvement and the realization of the self in these atmospheres of emergence together with every members and powers acting upon it. On this point, this way of understanding the notion interiority is the major concern of the contemporary practices in the urban interiors.

3. Urban Interiors as Experimental Design Pedagogies

The shifting relations between the inside and outside realm have been a multi-faced interaction, since the earlier experiments of generating the spatial unity. However, as it is discussed above emergence of public sphere, modern society and the individual are the major issues in the formation of contemporary inside-outside relations, where the notion of *space* and its *envelope* transforms into more intangible understanding of *territory* and *border*, regarding to a more dynamic understanding of place making.

In this respect, resonating with Simmel's mental unfolding of the metropolis, the notion of *interiority* expands to a broader scale over the urban realm, in various processes of territorial individuation and dynamic ways of belonging. This expanded re-valuation of the interiority is acknowledged remarkably in the architectural realm, through which novel publications like Rice's Emergence of the Interior: Architecture, Modernity, Domesticity (2007), Pimlott's Without and Within: Essays on Territory and the Interior (2007), as well as Preston's edited AD journal entitled Interior Atmospheres (2008) and Hinkel's project portfolio about urban interiors (2009) are observed (Figure 1).

Sequentially rising from diverse institutions around the globe, the notion of *urban interiors* (Hinkel, 2011) emerges as a novel design strategy and pedagogical approach that investigates diverse potentials of the urban domain. In this respect, the pedagogical experiments in ITU-Istanbul Technical University (2006) and in SUPSI – Scuola Universitaria Professionale della Svizzera Italiana (2008) in the frame of IMIAD-International Master in Interior Architectural Design graduate program collaboration, as well as the initiation of a research collective in RMIT-Royal Melbourne Institute of Technology (2007) appear as the initial institutional contri-

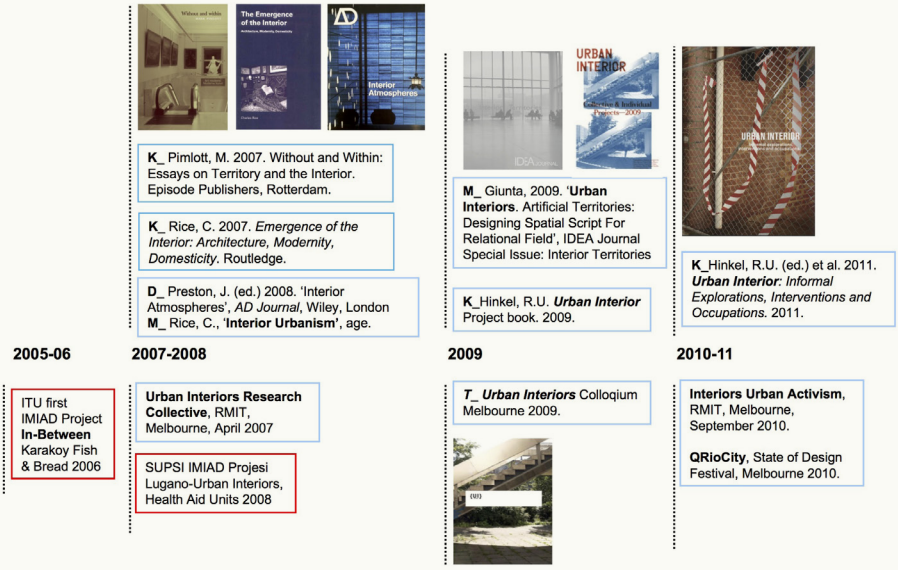


Figure 1. The time line indicating the growing academic interest about studies on interiority.

butions. Resonating with these experiments, after 2010 initiation of new graduate programs the Public Interiors in TU Delft (2013) and [MUID] Master of Urban Interiors Design in collaboration with PoliMi & CEU Madrid (2014) comes front as the recent education programs focusing on urban interiors.

Departing from these facts, and globally interacting with the growing domain, ITU-Istanbul Technical University performed the initial experiments, which then turned into regular studio exercises in the curriculum after 2012. Besides, being located in one of the biggest metropoles of the Europe, and even in the very heart of it, immensely funded to the process of developing diverse studio exercises, and experimenting various pedagogical strategies and tactics. On this detail, the essential notions of territory, atmosphere, intimacy, belonging, existing together, memory and projection have been studied in the frame of urban interiors in Istanbul. So, in relation to these key notions, four diverse exercises that have been carried in ITU are reflected accordingly.

In the initial studio exercise *Space X*, students are asked to develop spatial interfaces that facilitate qualified urban interiors within the central campus in Maslak district. A path from the entrance of the campus

	Steps	Pedagogical Strategies
Goals	Production of qualified urban interiors	Focusing on the conceptual characteristics of interior space
Tools	Examining the potentials of physical interfaces	Skin elements, form, scale, material, surface, texture, light, color, etc.

Figure 2. Table resuming the goals and tools, steps and pedagogical strategies of the exercise.



Figures 3, 4 and 5. Student work, Space X, by Giullia Perri.

and leading towards the main library is given as the main route to create urban interiors on and around of it, which are also assigned with related functions need within the campus life. As the methodology of the exercise, students are encouraged to make quick analysis of the site and perform design (Figure 2).

Thus, focusing on the conceptual characteristics of interior space is the pedagogical strategy. On the other hand, in order to understand the potentials of physical interfaces, various characteristics of skin elements, differentiating forms, scale, material, surface, texture, light, colour, etc. properties are examined to generate specialized territorial and atmospheric conditions (Figure 3, Figure 4 and Figure 5)

The second studio exercise Urban Interiors is executed to the core studio groups, which addresses the notions of belonging and existing together, while questioning the potentials of urban interiors in the production of urban spaces that are embracing, democratic and enliven, whereas integrating the citizens with the city. This studio exercises organized in two steps, where the first one aims the contextual reading

PROJE 1: URBAN INTERIORS
Phase 1: Analysis
Methodology: Site Visit
Aim: Contextual Reading

	Steps	Pedagogical Strategies	Tactics	Assessments
Goals	*Genius Loci*; the atmosphere of the urban sphere	Differentiating intensities	Understanding through implicit tactics	•Examining ***data gathering*** and ***analysis methods*** about ***urban interiors studies*** by researching in the city, observing and comprehending heterogeneous structures •Questioning the potentials of urban interiors in the production of urban spaces that are more ***embracing***, ***democratic*** and ***enliven*** that are integrating the citizens with the city •Development of urban spaces from ***macro to micro levels*** by using ***interior architectural tools and methods***, and configuring ***urban interior atmospheres*** Experimenting novel methodologies and pedagogie for ***data gathering, methods of analysis***, and ***design concept development*** process
	Potentials of urban interiors	Typo-morphological differences		
Tools	Phenomenological readings on the site	Transcription and dismantling of the sub-layers	Game_find something; Documentation; 4W1H	
	Mind mapping	Assigning meaning to the context, the syntax	Implicit	
	Re-constructing	Interpretations and reproduction	Group Studies	

Phase 2: Project Development
Methodology: Studio Studies
Aim: Existing within the urban sphere

Goals	Organization of urban interiors	Questioning the conceptual relations on urban interiors		
Tools	Mood board, story board			
	Atmosphere, texture, material, color, light, scale	Thinking and designing by using interior architectural tools and methods		
	Working with diverse scaled models	Questioning the inter-scale, piece and whole, detail-system relations		

Figure 6. Table resuming the goals and tools, steps and pedagogical strategies of the exercise.







Figures 7, 8 and 9. Reproduction models from the studio.

of the given district through site visits, and the second step aims to generate ways of existing in the urban sphere through developing individual design projects (Figure 6).

So, in the first step, the goals are comprehending the genius loci – the atmosphere of the urban sphere – and detecting the urban interior potentials, while revealing the differentiating intensities and typo-morphological differences of diverse urban interiorities as the pedagogical strategies. In order to fulfil these goals; phenomenological readings on the site to transcribe and dismantle the sub-layers; mind mappings in terms of assign-



Figure 10 and 11. Student work, Portable Balconies by Aybuke Safi.

ing meaning to the context; re-construction of the site in the studio through the conceptual models in order to interpret and reproduce the given milieu are the tools of the first phase (Figure 7, Figure 8 and Figure 9).

Yet, organization of urban interiors, becomes the main goal of the second phase. Mood boards, story boards and models with diverse scales are used as essential tools together with other interior architecture components like atmosphere, texture, material, colour, light, scale. In this way, students are steered to think and design by using interior architectural tools and methods, while questioning the inter-scale, piece and whole, detail-system relations (Figure 10 and Figure 11).

In the third studio exercise, Urban Interiors Istanbul, Flâneure & Mémoire students are asked to elaborate Benjamin's two notions, in order to develop urban interiors on Istiklal Street, one of the oldest streets in Istanbul, while resonating with the philosophical as well as socio-political dimensions of the terms and their immense capacities with memory and belonging (Figure 12).

In this respect, perception and transcription of socio-cultural layers are the main goals of the analysis phase, so that students are directed to attain the related data for the project process. In the light of these goals, students are advised to spend longer duration in the site to act like a flâneure to deeply observe and experience the milieu, in order to dismantle the sub-layers that are consisting the whole; to map the circulation of the citizens, objects and goods and follow the perception of the users; to find the object of exchange that enfolds both socio-cultural and trade values; to interview the residents in terms of assigning meaning to the context; and to do archive researches to gather the previously lived mem-

URBAN INTERIORS Istanbul, FLÂNEURE & MÉMOIRE
Phase 1: Analysis
Methodology: Site Visit
Aim: Contextual Readings

	Steps	Pedagogical Strategies	Assessment
Goals	Perception and transcription of socio-cultural layers	Attaining the related data for the project process	•Examining ***data gathering*** and ***analysis methods*** about ***urban interiors studies*** by researching in the city, observing and comprehending heterogeneous structures ***together with foreign students from different cultures*** •Focusing on ***social layers*** •Finding the ***objects of exchange*** bulma, •Questioning the ***philosophical*** and ***abstract thinking*** practices through the ***traces left in the city***, and re-establish them in the project process through ***relating*** them with the found ***exchange objects*** •Focusing on ***urban interior spaces***, and questioning their spatial potential •Questioning the notions of ***territory and border*** •Creating a ***spatial experience*** •Including the ***subjects*** and ***notions*** with ***philosophical dimensions*** into the ***studio exercises*** and ***design process***.
Tools	Observation and experiences (Flâneure)	Dismantling sub-layers consisting the whole	
	Mapping	• Circulation of the citizens, objects and goods • Following the perception of the users	
	Finding the object of exchange	Objects that enfolds both socio-cultural and trade values	
	Interviews	Assigning meaning to the context, the syntax	
	Archive research	Mapping the previously lived memories	

Phase 2: Project Development
Methodology: Studio Studies
Aim: Existing within the urban sphere

Goals	Organization of urban interiors	Questioning the relations of layers of life, memories, belonging, being now and there
Tools	Designing the urban interiors by using the spatial elements of interior architecture discipline	Notions of territory, border, atmosphere

Figure 12. Table resuming the goals and tools, steps and pedagogical strategies of the exercise.



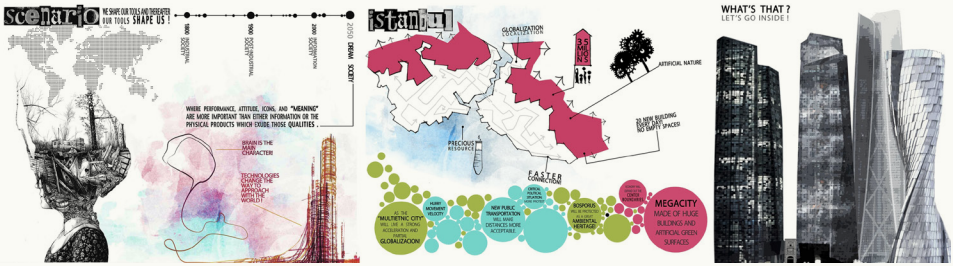
Figure 13 and 14. Student work, Mémoire Narmanlı Han by Mischalara Beccaro, Anna Spichalsky, Marian Müller, Jasreet Kaur

ories. Yet, on design development phase, students are asked to organize urban interiors, through questioning the relations of layers of life, memories, belonging, being now and there. They are encouraged to deploy the spatial elements of interior architecture discipline and generate innovative interpretations of the notions of territory, border and atmosphere in their design processes (Figure 13 and Figure 14).

In the final studio exercise, Urban Interiors Istanbul 2050, students are asked to re-questioning the potentials of urban interiors, on behalf of

	Steps	Pedagogical Strategies
Goals	Context development	Lifestyles in Future
		City and urban interior in future
Tools	Cinematic narratives	Examination and discussion of the presentations of future and spatial representations in futuristic movies, by using cinematographic tools.
	Scenario development	Generating future envisions about world, Istanbul and Istiklal street in particular.
	Visual narrative	Critical image
	Story board	User profiles
	Definition of the characters and users and their diagrammatic expressions	Design story
	Conceptual models	
	Conventional design development process	

Figure 15. Table resuming the goals and tools, steps and pedagogical strategies of the exercise.



Figures 16, 17 and 18. Student work, Space X, by Giullia Perri.

context development and future projections. Once again students are encouraged to work on Istiklal Street and envision it in the year 2050 (Figure 15).

Since, context development is the main goal of this exercise, imagining the lifestyles in future and the prospect condition of the city and urban interior in future is the pedagogical aspect of the studio. In terms of attaining this goal, students are steered to deploy the tools of cinematographic narratives in the conceptual development of urban interiors. Thus, the spatial representations in futuristic movies are examined and discussed. Students are also asked to develop future scenarios gradually about the world, Istanbul and Istiklal street in year 2050, and generate

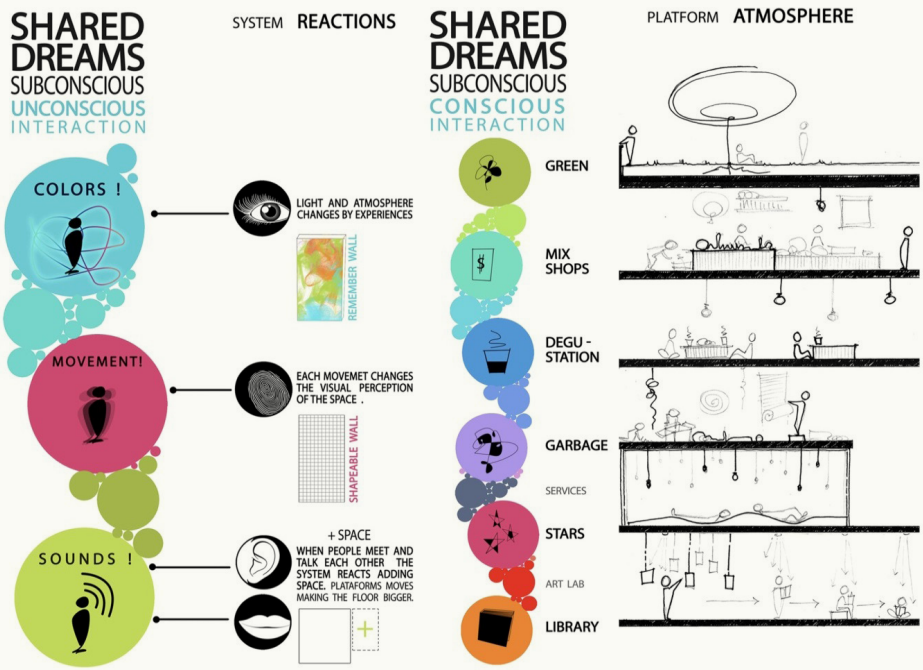


Figure 19. Student work Shared Dreams, by Giullia Perri.

critical images as their visual narratives. They are directed to define the user profiles and generate individual design stories via story boards and diagrammatic expressions (Figure 16, Figure 17 and Figure 18).

Although these studio exercises are still experimental to develop initial awareness of the under-graduate and graduate students about the urban interiors, and although the instructor team gained a lot of experiences in terms of generating implicit and explicit tactics, as well as deploying various methodologies of teaching for this topic and test the potentials of the alternative sites in a very dynamic urban sphere like Istanbul; however, the experiments related with this topic is still missing hands on practices that derives out from the studio processes. As a self-critic, in terms pedagogical strategies for the next step, the instructor team is focusing on the site implementation of the outputs of the studio processes, that will be held together with the communal participation of the inhabitants of the milieus.

4. Concluding Remarks and Discussion

For the concluding remarks of this long and fragmented debate, it is worth to mention once again the importance of the urban interiors and the decisive role of interior architecture as an innovative approach for the continuity of urban life. Like discussed earlier, depending on the social transformation, which has developed in relation to huge techno-informatics-socio-economic change that is happening on a universal scale; interior architecture emerges as an important disciplinary knowledge and practice to establish and strengthen the communication between the city and the citizen, citizen and citizen, via creating the atmospheres of intimacy within the public sphere.

Indisputably, the urban phenomenon is an essential unity that exists with the contribution of multi-disciplinary aspect. Although the production of the public realm is an inter-disciplinarily process with the contributions of urban planners' macro-scale plan decisions, architects' function assignments, landscape architects' interventions integrating human with natural systems, product designers' innovative city furniture that gathers best human ergonomics with the city life, or public artworks of the artists', but there is still a need for holistic approach to run these diverse layers within a unique atmosphere. In this respect, interior architecture holds a leadership role in order to re-organize the urban space/public sphere and the interdisciplinary communication in between the disciplines, to generate livable atmospheres. In this context, the disciplinary knowledge and experience that interior architecture possesses about creating intimacy and spatial atmosphere via sensual values and affective spatial patterns that resembles spirit of the space and the sense of belonging, and further the feeling of being in now-and-there (dasein). So, interior architecture is of great importance as a discipline that contributes to make urban sphere as an enliven milieu for the citizens through urban interiors.

Of course, a public space in which people are excluded is not a common sphere. Public spaces or in other words urban spheres that are segregated from its public, neither belong to its citizens nor embrace the city. In this way, individual members of the urban collective are unable to connect with the city or to feel belonging to it, and unable to become the inhabitant of the urban sphere that they are existing.

As a result; urban interiors emerge as innovative approaches and practices that bring together diverse layers of the city and urban structures (ie different socio-political-economic groups living in the city). They also

bind together and intermingle diverse systems of existences, as well as making them to share and interact within each other (Sennett, Arendt). They further provide spaces of appearance (Arendt, Habermas) for every member of the urban collective (women, men, young, old, children, disabled, rich, poor, educated, untrained individuals), while exploring the dialogue in-between them through various improvisations. Thus, by using the tools of interior architecture, urban interiors also appear as novel practices that deploys the aspects and knowledge of interior architecture possesses, while creating spaces that are non-repressive, non-discriminative, but hospitable and embracing (Douglas), yet humble, sincere, in human scale, and possessing vital qualities of the urban space that increase the level of physical and psychological comfort of its citizens.

Emine Gorgul
Associate professor, Vice-Chair of
Department of Interior Architecture,
ITU School of Architecture, Turkey
gorguile@itu.edu.tr

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Designing devices to manage the relationship between elderly people and their ecosystem to improve their decision-making capacity in the home

Gaël Guilloux, Marketa Fingerova

Abstract

A designer, an anthropologist and students of design from l'École de design Nantes Atlantique aim to address the issue of adapting the habitat of the elderly people by co-designing solutions with them and their ecosystem and by using ethnographic research methodologies to conceptualize a new design. Some devices, such as a water jug, a shelf, or a game can function as medium that harmonize the relationship between the elderly people and their ecosystem. We present the results of a three year project chronologically, introducing the co-design tools in each section that was used for the development of the final design. The findings of our pedagogical approach as it evolved from one year to the next, are highlighted. The conclusion is based on results in terms of pedagogy and of use of co-design methods and tools in order to determine the specific approach in designing for and with elderly people.

Theme: Innovation
Keywords: design process(es), design tools, interdisciplinarity, user centred design, collaborative design

First, we would like to announce some definitions to set the framework of our research. Adapting the existing living environment (habitat) to the ageing population represents a major challenge for society in the coming decades. The term 'habitat' as used in this research paper, is applied in relation to the built environment, specifically the human and technical spaces and systems which compose it, but also as the inhabitant's ecosystem. The ecosystem for elderly people must be in tune with their needs and expectations, their frailty and level of dependency. When we use the term 'inhabitant's ecosystem' we presuppose the following definitions: an inhabitant is a person who inhabits, lives ordinarily in a place, who resides there (Larrouse, 2017). In economics, the ecosystem means a group of entities (organizations, companies from a given sector or industry and their stakeholders), who are jointly involved in an ambitious development project, based on the agreement of each party to honour a number of predefined commitments to the other parties. What the actors who make up the ecosystem have in common is their contribution to the creation of added value for the other actors, based on a "contract of long-term commitment and consequences" generally initiated and supported by the public authorities.

Our experience with elderly people during previous pedagogical projects, we learned that the elderly people differing states of physical and psychological frailty demand acts and solutions in terms of human and technical systems, as well as appropriate and flexible living environments (as, for example, adaptive housings to mobility decreasing). They can guide us (as innovative users) in the design of these systems and living environments. Therefore, it seems imperative to work closely with them.

The design projects carried out in the Care Design Lab[1] since 2014 reflect on how design could help the elderly stay in their own homes despite the fact that they have become dependent. We will discuss here the way they were conducted and what tools were developed to determine the specific selected approach in designing for and with the elderly.

1. Devices as vectors of a better relationship between elderly people and their ecosystem

Design summons the resources from a context (knowledge, description) making it possible to interpret the practices involved in the problem and thus better identify the issues encountered, in this case those relating to elderly people in their habitat. Wallace, Blessing, Matthews (2002) point to the way in which elderly people perceive, imagine, experience, value, degrade the device to improve their intelligibility.

The designer carries out initial explorations which precede the suggestion of various possible solutions, before ultimately finding a satisfactory solution (Lawson, 1990). The effect of this solution must improve autonomy in the living environment. The two complementary aspects 'problem' and 'solution' are developed simultaneously (resolution by synthesis, Cross, 2002). This leads to a "creative redefinition of the problem" and a solution located outside of the supposed limits. The suggested solutions are used, "invested" in great detail in order to understand the real problem of keeping people in their own homes despite their dependency (decomposition and development of the solution) and quickly identify the final solutions. This comes from the designer's ability to be

1 The Care Design Lab is one of the four Design Labs at L'École de design Nantes Atlantique which have the function of piloting the school's Master's programs and developing design research in specific topic-based fields, in partnership with academic laboratories. The topics covered by Care Design Lab are health, quality of social and environmental life and public innovation.

a go-between (helping to raise awareness of potential improvements to well-being) and an ally for these users (who helps make it a reality) and in their relationship with the people around them in the ecosystem.

The design process helps stakeholders reach a decision by highlighting the various elements, knowledge and all the social, technical, legislative, economic and material possibilities, arguing for and facilitating choices at each level of questioning, using representation and formal, aesthetic and ergonomic formalization of functions. In above mentioned design projects carried out in the Care Design Lab we question and experiment implementing a device or a combination of human and technical systems (space, product, service, etc.) as a "mouthpiece" to achieve this harmonious collaboration.

This mechanism is intended to be:

- an "enhancer" of the roles and interrelations of stakeholders around the elderly people;
- an absorber of tensions linked to the intended, assumed or actual roles of the various stakeholders within the range of levels/degrees of collaboration;
- an observer of the circumventions and diversions imposed by the inhabitants and the other ecosystem stakeholders.

2. Ground research

In a user-centred design project, two roles can be identified from the participants: to instigate and drive design processes, but also to be the subject of these initiatives. We believe that the transition from projects initiated by designers in the traditional sense of design, to a process in the generic sense which involves human beings, and therefore all the stakeholders, is necessary in the context of independent living.

In Care design lab we developed and followed approximately fifteen design projects to increase the autonomy of elderly people who are losing their autonomy working together with Master's student designers between 2014 and 2016. The skills and expertise on themes specific to independent living come from a twofold preliminary process of acculturation before each phase of the project, combining monitoring, meetings with experts and specialists (caregivers, psychologists, occupational therapists, other health specialists), and field work (Bucciarelli, 1994; Kruger & Cross, 2006; Ramlogan, Mina, Tampubolon, & Metcalfe, 2007).

The project utilised an anthropological research approach combined with design research approaches. Like Herbert Simon (1969) we define design as any finalised process which proposes to change the order of things to achieve more satisfactory results that benefit the elderly. The partnership between design and anthropology operates through a variety of methodologies and tools which are discussed for example during annual EPIC conferences on ethnographic experiences in industry. In the context of our research we experimented with a combination of different ethnographic methods which allowed us to create a holistic viewpoint of the ageing process in the living environment. We broadened this approach using design-specific methods and tools.

The design activities and responsibilities were defined by the very nature of the projects, enhanced by elements resulting from monitoring, then by analysis and data synthesis, and on the basis of a strategy aiming to propose and work in collaboration with the targeted stakeholders. (Bruce et al., 1999; Bucciarelli, 1994; Chen, 2005; Damanpour & Wischnevsky, 2006). Unlike a traditional design approach which, in some ways, interprets the values that can be brought to elderly people, or to other stakeholders on or in their living environment (Boenink, 2010; Harfield, 2007), we made regular back-and-forth visits to the ecosystems, in a trial and error approach. Throughout the project, we consulted experts in the field of independent living, in connection with the issues which were identified and detailed as the projects progressed.

The influence of companies and other economic actors were reduced as the problematic was chosen by the elderly inhabitant and the designer (who organizes this collaboration like a mediator, a go-between and an ally). The fieldwork sites included supported living and nursing residences, individual or collective housing, with direct visits or via home-care or meals-on-wheels associations. We met fifty elderly people (active, frail or dependent), aged from 65 to 98 years old, in couples or living alone.

The experimental stages were carried out in the form of research projects, or through the supervision of projects conducted by the Master's students. The analysis, synthesis and design of methods and tools were implemented on a set of projects involving the elderly.

The projects cover a range of diverse functions within the elderly's home environment (layout of the kitchen area, bathroom, corridors, medically equipped bedrooms, home-based shopping, development of housing to maximize autonomy – follow-up of work, assessment of autonomy) and were of interest to various users, with differing degrees of dependency.

3. Methods

We predetermined the process of mapping the ecosystem, the methods of implementing ethnography and a process of co-design to develop the device(s), as well as the consideration and development of our response to the needs, expectations and constraints of the ecosystem (Bernard, 2006; Grange, Desjeux, Rebours, 2015, Gardien, 2015).

We used the Regional Innovation Systems (RIS) cartography to identify the users and other stakeholders in different contexts (their roles, actions and the interrelations between them), and to establish "innovative ecosystems for autonomy and longevity in the home". The flows generated by the players in the ecosystem, together with existing solutions, help to identify causes related to the specific problems of elderly people and, consequently, design approaches and activities capable of providing solutions and changing the ecosystem for the better.

3.1 The three phases of the project

Data collection, using ethnographic project methods, was divided into three different phases as well as the design project itself:

In phase one of the project, the designers went into the field in large groups. The field work sites in this phase consisted of different residences for elderly people with different levels of dependence. The designers spent several days carrying out rapid ethnography accompanied by the sensitive design approach in order to collect as much visible and invisible data as possible. In order to do so, they were divided into groups and each group participated in different activities taking place in the elderly peoples' residences and collected data on them. We used the Grounded Theory as the data analysis method, developed by sociologists Glasser and Straus (1967). It defines themes across the data sets which helps to describe a phenomenon that is associated with a specific research question. Thanks to this analysis, the designers were able to define themes that emerged from their field notes. This phase was crucial for the designers, not only to familiarise themselves with the lifestyle of elderly people but also to hear the testimonies of people living at home or in the residences.

In phase two we started the co-design activities with the participants. We are interested in the relationship between the user and the devices in the context in which they are used. The designers divided their roles during the co-design process and thus some of them were active participants of the co-design process and some of them were passive observers.

This approach helped to verify during data analysis whether what the participant says is in coherence with his/her movements, body language, etc., particularly regarding the participant's relationship to different devices in his/her living environment. In addition to performing rapid ethnography, some of the designers asked participants to keep diaries of their experiences including photographic documentation in order to see if the behaviour of the participants in their environment changed when the observer was not present.

In the third phase of the project the designers continued with the co-design process in order to finalize the design.

During the final two phases, an additional field study took place between the designers and the elderly participants. It improved the final design outcomes. It confirmed the values and attributes of the devices (which could take the form of a service, product, space, graphics or digital product), affirming the posture and the decision (such as, deciding or not to leave home to go to live in nursing home) of the user. We created step by step "user-device" couples by refining the research question and looking for a satisfactory response (which could take the form of a service, product, space, graphics or digital product).

4. Results

The results of the three years of projects are presented chronologically in this part of the paper. The length of the projects was different each year depending on the results and evolutions done to improve them. We highlight important findings concerning the evolution of our pedagogical approach from one year to the next and evaluate our approach.

4.1 The results from 2014

In 2014, the project was focused to give value to elderly peoples' knowledge to their immediate environment, such as local policies (the public space used by all age groups). The project took one week during which the designers visited two nursing residences and individual homes and performed rapid ethnography. The interaction between designers and elderly people was divided into two phases: after the first round of semi-directive interviews, the designers worked on their propositions which they presented to their users several days later. They have to identify the most visible issues in the nursing residences and homes. The identified

issues often concerned the lack of communication with other residents and also with the outside world, therefore the feeling of loneliness, social isolation and, by extension, uselessness for society were the most current problem.

The concept propositions that designers made clearly lack detailed work with the end user and the nature of propositions shows the insufficient time that designers had to develop an innovation concept. It made us think about the time the designers need for the proper development of their concepts (to analyse the social, artistic, legal and material aspects of their propositions), the time they need to spend with the users, and how to approach them in order to get the most reliable and authentic information. We also questioned the capacity of the designers not to take their field work experiences too personally in order to be able to come up with a pertinent concept.

Often the need to keep the elderly person's autonomy has been underlined. Thus we decided to question the autonomy of elderly people in their living environment in more detail in the following years.

As one of the resulting concepts the water jug has been developed. Its aim is to help re-establishing social connections among elderly people. The water jug has two handles. One for the assisted person and one for the caregiver. It enables another person to step out of the role of "assisted



Figure 1. 3-dimensional images of the possible transformations of the water jug following the co-design process with the elderly, XX, 2014.

person", and to become a caregiver (as elderly people wished for all along the field work). The product does not need to be carried, but is still guided by the caregiver if necessary. Back and forth with elderly people success to finalize the design, but the next step, which will consist to deliver some products in nursing homes to observe the users behaviours, was not done.

4.2 The results from 2015

In 2015, the project took three weeks. The bibliographic monitoring and field work was organised in a way to enable to understand as much as possible about the issue of (in)dependence and autonomy of elderly people in their habitat. We worked closely within residence for healthy seniors, a nursing centre and within family houses of healthy and unassisted seniors. The first field work phase was performed in groups with the aim of capturing as much ground data as possible and performing qualitative analysis of those data. Then the designers split in pairs. Each pair proposed two concepts and, after user feedback, created one final concept. This time the designers did not develop any co-design tools. The solutions were more relevant and coherent to the target, and better complied the attempt objectives than the ones designed during the 2014 project. Designers were mainly end-user focused, often missing the necessary link with all the nearly ecosystem needs (natural and professional caregivers, family and friends, etc.). We (the authors) also identified through the solutions, the distance between the objectives, the ability to receive and to bring the new solutions of nursing centre and within family houses of healthy and unassisted seniors; and the end elderly user's needs, behaviours, and ability to change their attitudes. We conclude the need to follow-up the ecosystem in accepting and change driving to allow the development of these new solutions on the market, to make them accessible. Knowing this we decided, for the 2016 project, to not only work on the co-design the solutions with elderly users, but to add several steps, which have to associate the other stakeholders in the co-design process.

The Hive, one of the final propositions we describe in this paper represents a 'living art piece' of boxes in the shape of a rhomboid that are fixed day by day and piece by piece on the wall in the home of an elderly couple. This concept allows to instigate or pursue a discussion about their past (recent and distant). An object would be placed in each box that represents a moment in the history of the couple that they don't want

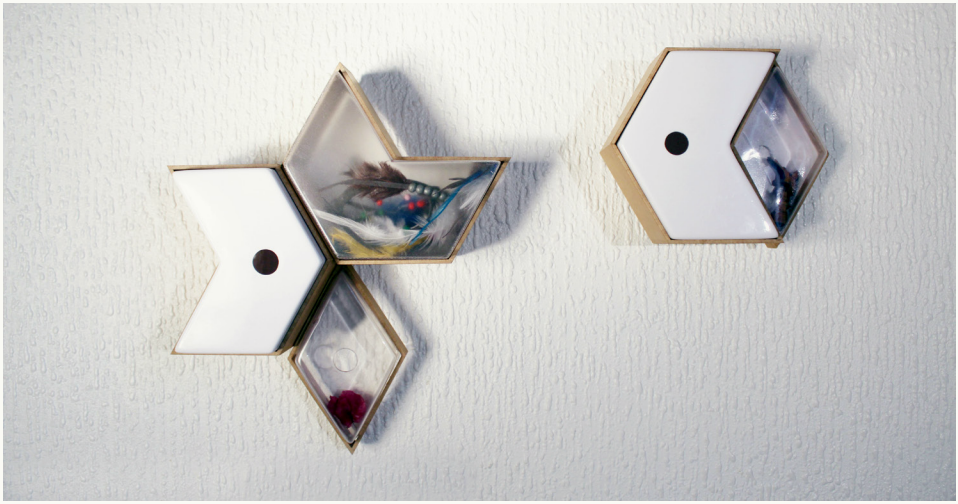


Figure 2. The prototype of the final solution which originated from the Hive concept, XX, XX and XX, 2015

to forget. Thus piece by piece, week by week, the couple creates the hive on their wall and re-open boxes when they like. The design was experimented by two couples, where the one partner suffers from Alzheimer's disease. They found it creative and motivating and were engaged to put it in practice. Their caregivers used it naturally as a memory exercise.

4.3 The results of the project that took place in 2016

In 2016, this project became significantly larger than in previous years. The project was conducted over four months as opposed to one week. In addition to rapid ethnography we were also interested in setting up tools designers can use to carry out quality fieldwork, such as Evernote (cloud-based note-taking and file-storage application that synchronizes data across multiple devices) to capture and organize data all along the data collection. We also realized a complete state of art on the relationship between elderly people, devices and their human environment through interviews with experts and a bibliography research, in order to have a real statement of the problematic. The designers participated in observation methods before instigating the project. They monitored how elderly people adapted their living environment. The initial field work took place in residences, in independent homes and allowed the designers and elderly to identify the first users problems.

We emphasised the importance of using participatory design during every single design project in the form of co-design with users. In practice, this means not developing *for*, but rather *together with* the target user group (Grond and Devos, 2016, p.6). Also as Grond and Devos (2016) mention, the participation of all stakeholders only works if the design process is recorded and mediated in a way that is accessible and meaningful for all. Therefore, the designers developed co-design tools adapted to the themes of the projects. During the second field work session, the co-design tools were used to specify the issue. Experimenting with them proved that they help to approach sensitive themes creatively and help the participants express their feelings and opinions about issues they encounter and sometimes don't like to talk about.

This new phase of experimentation also tested the integration of the device in the existing ecosystem of the elderly people. In order to do so the development of the roles and interrelations between the actors and stakeholders concerned by the device and the elderly user were observed via the experiments of the device(s) in action (as a language element of the elderly), and the analysis of the effective consideration of the posture and decision of the elderly users via the device, by these stakeholders and actors.

We were not seeking to achieve a negotiation between ecosystem actors, but rather a harmonization of the ecosystem for with a specific help of the device adapted to the uses and validated by the elderly users (moving from invention to real innovation). For example the water jug satisfied all the actors of the ecosystem: it helps elderly people, it induces help by other elderly people, it can be used by occupational therapist to relearn elderly people daily practices, it gives a consequent market (all the nursing home) to makers.

The analysis and synthesis of these experiments led to re-experimenting those situations that created questions, redefining the concepts or clarifying the problem studied, but above all, to constructing new methods and tools to facilitate this harmonisation (role-plays, escape room, serious games, etc.)

Based on this gaming-discussion two designers developed an "escape game" with an objective to test people's awareness of and solutions to falling down. It turns the intimate falling problems of the elderly to a role-game through a fictive person. As the problem of falling at home is often perceived as a taboo or weakness by both the elderly and their surroundings, we developed a communication game which prompts discus-

sion on the following topics: the devices we use to prevent falling, the physiological functions that can cause falls, the devices and objects present in the home environment that can cause elderly to fall. Playing this board game was a powerful co-design tool to collect data on their falling.

The Old Escape integrates situations that lead to falls in places around the home with the highest risk of falling (like hall or stairs), followed by the bathroom, kitchen and bedroom. People entering the escape game are given different devices that decrease their physical and physiological abilities. In accordance with ageing such experience is supposed to be the first step of resolving concrete problems of elderly in their surroundings.

5. Conclusion

Over the three years of pedagogical design projects we experimented developing co-design tools that help to encourage discussions concerning the research problem. We succeeded, particularly with respect to the 2016 projects, to make emerge innovative concept attributes and to answer the users' needs. Despite the fact that the designers are students who learn using ethnography and not ethnographers themselves, they managed to capture the most important data thanks to the co-design tools they developed. But the other steps, as integrating the professional in the co-design process, make clear that there are relational difficulties to be handled. Thirty percent of the professional clearly did not accepted the solutions co-designed with the elderly-users mainly enunciating that they can't decide by themselves. More than sixty percent of the elderly people were interested by the solutions as a definitive help rather than a tool that should help the elderly anticipate the loos of autonomy. The Designers took additional steps to better frame these new solutions. Such results clearly reduced the power of the new solution to engage elderly users in new behaviours and brought the risk that the elderly finally were not interested in a too professionally framed solution because of its reduced sense and value. Moreover, there are different kinds of reactions and answers by professionals (for example by refusing the autonomy given to elderly people by the devices, or by accepting the autonomy given to elderly people but trying to include it in a restricted process that needs their intervention). For this reason we are convinced that the professionals clearly need to be engaged in the early steps of the co-design process, in order to better understand the elderly people and to have a common professional vision.

Based on these results, we (the authors) aimed at determining the specific approach in designing for and with elderly people.

In the monitoring phase, the priorities to a creativity activity in the field of design are the motivations which define the actions of the elderly users. At this level it is necessary to characterise:

- how the relationship with the self and others influences choices and devices, and
- how these choices and devices are themselves sources of impact on the relationship with the self and others.
- There are therefore two dimensions to be incorporated into monitoring when the designer is concerned with the elderly user:
- the personal dimension of the choice (relationship with the self):
- the relational dimension of the choice (the other people involved in the decision-making).

5.1. The personal dimension of the choice

The personal dimension of choice in elderly people seems to us to be linked to 3 components whose content (implications) must be identified:

- individual priorities to be determined (namely by accessing implicit/implied information);
- presence of human support mechanisms which, the users mediate, regulate or distance;
- technical support with which the users mediate, regulate or distance the human support.

The personal priorities

A designer has to be able identify the implicit, that elderly are often not able to express or which they are quite simply unaware of.

The list of elements is never complete and depends entirely on the situations which determine, specify and define it. However, these elements allow us to sketch out the key characteristics of an elderly person, which could facilitate the work of the designer. This work helps identify the first lines of investigation in the monitoring process. These lines are:

- the nature and expression of the elderly people's relationship with (and attachment) to the living environment;

- the level of transformation necessary to remain in the habitat despite the dependency.
- the quality of the relationships between the elderly person and their family and friends, between the designer and the elderly person and between the caregiver and the elderly person. The designer must be particularly attentive to the attitude through listening, pace, sensitivity and time spent with the elderly person;
- the user's model of life must be identified, avoiding any influences of other actors on elderly people;
- the nature of the cohabitation imagined by the elderly in their habitat with their entourage;
- the nature of genuinely desired activities which help elderly people to "cling onto life", as well as existing adaptations and those necessary to continue these activities;
- the existence of negative experiences and the discriminating effect of other people's judgement which prevents them from continuing these activities,

The presence of human support

The designer must reflect upon the modalities of human support. How does this enable the elderly user to:

- continue with their daily activities as normal;
- rediscover the satisfaction of skills acquired in the past;
- enjoy the advantages which result from human support.

In order to do so, we (the authors) established that it is important to investigate certain topics in the monitoring phase to determine the functions, ergonomics, form or aesthetics; then in the creativity phase to ensure that:

- the devices respect or amplify intangible factors due to the input of human support;
- elderly inhabitants capitalise on the advantages brought about by the act of human support and not on the act itself. It is a question of designing the device so that the experience it brings, or the projected effects that it may generate, focus the dependent elderly person's interest on what the device helps to create, and not its actual use;
- the devices serve as mediators between the challenges specific to elderly people and those of human support. Which means identifying

the degree of discrimination and empathy involved when providing human support to the elderly. The device created has to play on the ability of human support to know its place, to gauge its contribution free of emotion, which certain elderly are no longer able to filter.
- the technical devices support the relationship between the elderly inhabitant and human support, but also between the various caregivers. The elderly user must be considered on several levels; the individual level, the family situation, etc.

In the creativity phase, it will be necessary to assess the actual effect of creative propositions on these different levels.

Technical support

It is important to understand, as part of the monitoring process, how technical support coordinates or distances human support. We must also gain a better understanding of how the elderly are able to actually mediate human support through technical support. We have determined an initial series of potential determinants in the choice of technical support by the elderly, which must be clearly defined in connection with the problem being examined. This list is also not comprehensive and depends very much on the situations and context which determine, specify and detail the choices:

- the time variable,
- the shared history,
- the device as part of the daily routine,
- the device customisation,
- the reasons for refusing this support.

5.2. The relational dimension of the choice

The work of the designer must seek to understand, how the different kinds of relationships shed light on the decision-making process for elderly people.

The aim is to be able to create a cartography of actors with specific roles, duties and interrelations necessary for the implementation of the device, all of which must be incorporated into the creativity process.

The devices within the habitat should, to some extent, make the relationship tangible within very precise worlds, issues, subjects, situa-

tions and contexts. During our immersion periods, we are committed to revealing possible areas in which relationships influence their choices. They can support them or undermine them depending on the situation.

In the second phase, we sought to identify the devices at stake and to validate the advantages of a design input in these devices, in order tomanage the interactions between the actors and elderly people more effectively. The design approach must:

- incorporate the multiple relationships upstream (care receiver – caregiver – medical professionals, etc.);
- Identify how the technical or communication devices available can facilitate exchanges.

It is important that the products, interfaces, spaces and tools created promote the creation of ties and interdependence, and that we obtain relevant results. The device has a dual purpose. It should allow the elderly to feel independent and free, but it should reassure caregivers and enable them to help their charges in complete safety. A consideration of functionalities which satisfy these two purposes is essential. This implies leaving the opportunity, in the design of the device, for the elderly person to arbitrate.

We must keep in mind the purpose of the device to incite, maintain and develop social interaction between elderly people and their entourage (which is different from bridging the distance between them). We must avoid creating relational silos (elderly people with such and such an actor). Information (particularly when it concerns health) must be considered as a characteristic of the elderly person and not as his/her signifier. We must preserve a professional-caregiver relationship which does not disregard the elderly person – he/she must keep a central role as an individual and not as a “dependency”.

Mediation schemes need to be imagined which can enable realistic dialogue. The rules of creativity methods and tools in the field of design seemed to us to be very relevant since they prevent caregivers adopting a negative posture or criticism of propositions made by the person being cared for. In addition, they provide a crossroads, a place where we take into account divergence in the creation of a solution which, on the contrary, encourages convergence while respecting differences (it ensures that each person’s individual wishes are represented in the proposed solution). These tools allow us to play with human intelligence in order to

capitalise on the natural instinct to find one's place: a customised intelligence, with a predefined and jointly constructed goal, a collective vision of the ideal relationship.

The mediation schemes on the proposed steps and the associated devices could be relevant, particularly if we also involve professionals. The question of their role and the balanced division of power must be given careful consideration when creating devices.

Gaël Guilloux
Director of Care Design Lab
(PhD, engineer, designer),
L'École de design Nantes, France

Markéta Fingerova
PhD candidate at l'École Nationale
Supérieure d'Architecture Nantes and at
L'École de Design Nantes Atlantique, France
(MSc., anthropologist and teacher),
marketa.fingerova@crenau.archi.fr
m.fingerova@lecolededesign.com

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The Humane Technologies Collaborative

An overview of the "provocation, making, reflection" process

Peter Kwok Chan, Ben McCorkle

Abstract

This paper outlines the design process of the Humane Technologies Collaborative, a multidisciplinary working group made up of university faculty, students, and industry professionals with backgrounds ranging from design, art, dance, humanities, and computer sciences. This collaborative, funded by a special two-year university grant awarded to proposals that address persistent social or environmental challenges, brings together specialists in various areas to explore humane approaches to technological advancement – including virtual/augmented reality, wearable technology, and 3D printing – that allow us to imagine more livable futures and enhance wellbeing.

The core activity of this collaborative project is the Pop-Up Collaboration, a five-day, creative collaborative residency taking place in the university's advanced computing center for artistic research. Unlike more traditional long-term research projects, Pop-Ups come and go in a short life cycle with intense focus of organized teams around targeted questions and rapid creation. This approach is described by Norah Zuniga Shaw, who conceived and facilitated it as "akin to a carnival tent, it 'pop-ups' in the midst of everything to create a smooth space of sustained shared experience in our striated working lives." All collaborators are asked to participate in initial groundwork before the intensive period that includes sharing references and recent advances in the field via online platforms and writing short research statements. During the Pop-Up Week, participants, including students and alumni guests, created rapid prototypes, performances and other concrete outcomes together addressing specific discoveries. And afterward, all participants enhanced documentation with written and visual reflections and identification of future directions.

As the first part of what will eventually become a much larger and theoretical design process project, this paper summarizes the activities of a year-long collaboration as it unfolded throughout the Human Technologies studio space: the sense making, the concept building, the rapid prototyping, the problem solving, the play-testing, the reflection and discussion, and the refining. Taken together as a series of case studies, this highly dynamic yet deeply reflective process yielded surprising and useful outcomes. Ultimately, this paper presents a successful process model that can potentially be used in similar projects or purposes.

Theme: Innovation
Keywords: collaboration, humane technologies, embodiment, interdisciplinarity, discovery process

1. Introduction

Coordinating a truly multidisciplinary collaborative experience is almost certainly a challenging undertaking, but a potentially rewarding one, too – especially if that coordination is deliberately designed to engage the various creative strengths of all participants. In *Visualizing Research*, Carole Gray and Julian Malins (2004) make the case for "mapping the terrain" of a research project, arguing that creating and sharing a contextual review is an effective way of developing interdisciplinarity and collaboration, and to both situate and focus research activities. They write, "If we can articulate practice more clearly for ourselves then we are more likely to communicate better with other disciplines. By exposing ideas and practices to other professionals we can gain useful feedback. This communication can lead to the development of fruitful collaborations, and possible external support and funding" (p. 59). Additionally, contextual reviews can provide outsiders with a record of a particular collaborative process that they can then adopt and adapt according to their own group's needs.

This overview describes and provides institutional context for the design process of the Humane Technologies Collaborative, a multidisciplinary working group made up of university faculty and students with backgrounds ranging from design, art, dance, humanities, computer sciences, and even industry professionals. This collaborative, funded by a special two-year university grant awarded to proposals that address persistent social or environmental concerns, brings together specialists in various areas to explore what it might be like to work, to play, to share, and to think in more dynamic technological mediums that access our full multisensory capacities as human beings. Conceived and facilitated by principal investigator Norah Zuniga Shaw, the process invites group members worked into an emergent process with structured elements including a series of workshops, micro talks, ongoing discussions, and concentrated development sessions designed to foster creative approaches to developing technological tool that promote sustainable, healthy, and ethical applications.

This paper was written as the first of a three-part series and focuses on the task of mapping out a structured approach for conducting arts-

driven interdisciplinary collaborative research. It is part of a larger effort to first document the processes, then examine the individual and collaborative experiences, and finally present the overall outcomes of the Humane Technologies Collaborative. The authors worked closely with the principal investigator to observe, participate, and document the activities during the first year of this funded project. As the project develops, it will move from more practice-oriented and structural descriptions to more theoretical observations about how the process helped refine thinking about conceptual and content-based concerns. Figure 1 charts the eventual progress of this particular line of research inquiry.

In the subsequent sections, we provide an overview of the institutional setting, research orientation, and general workflow of Humane Technologies. Additionally, we offer a description of the collaborative process that occurred during the group's "Pop-Up Week," specifically highlighting the work of three breakout teams as they move from identifying problems to developing concepts to creating deliverables. Finally, we conclude by identifying key implications and outcomes from this

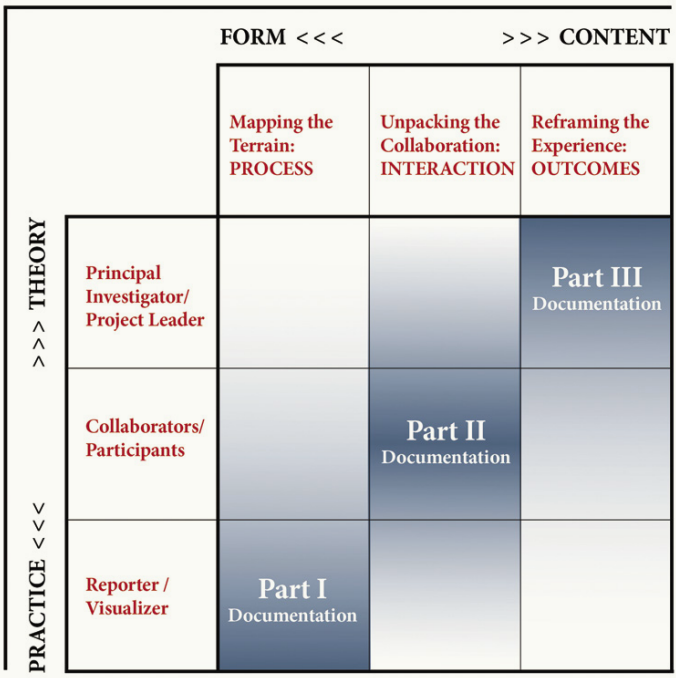


Figure 1. Process documentation research trajectory conceptual map – from Practice to Theory, from Form to Content.

collaborative process that are valuable considerations for those wishing to engage in similar creative collaborations, as well as personal reflections of the authors.

2. Institutional Setting and Context

The institutional affiliation of the Humane Technologies group is The Ohio State University, a large midwestern public research university. The collaborative is part a larger constellation of special multidisciplinary university-supported research and scholarship projects, collectively falling under an umbrella called Discovery Themes. Entering its sixth year, the Discovery Themes Initiative is a ten-year, multi-million-dollar project designed to address issues or problems that have global impact. Among the themes identified are Infectious Diseases, Food and Agricultural Transformation, and Chronic Brain Injury, among others (The Ohio State University, 2012). Humane Technologies is funded under the "Humanities & Arts" Discovery Theme, which was established to address the following criteria, according to a college-level summary document:

1. To deepen student engagement in the humanities and the arts;
2. To build intellectual community and collaboration among the faculty within the College of Arts and Sciences and across the university; and
3. To increase the university's national recognition and distinction in the humanities and the arts. (Noyes et al., 2016)

Generally speaking, the purpose of Humane Technologies is to bring students, faculty, and professional collaborators together in order to develop creative, exploratory research that addresses key concerns pertaining to how we can use various technologies in the 21st century in ways that are more ethical, responsible, and (as suggested by the group's name) humane. A two-year program, collaborators focused on the topic of Livability in 2016–17, and Wellbeing for 2017–18. One central outcome of this project as it was originally proposed is that participants will develop "interdisciplinary awareness and skills" that will transfer to other scholarly and pedagogical contexts; key to this outcome is creating "a framework for long-term investment to support mutually beneficial collaborations and develop further focus areas of significance to education in the humanities and the arts" (Zuniga Shaw et al., 2016, p. 3).

Directed by Norah Zuniga Shaw (Professor, ACCAD/Dance), the collaborative included faculty members and students from various departments, centers, and units within the Arts and Humanities at OSU. Foremost among these is the Advanced Computing Center for the Arts and Design (ACCAD), an interdisciplinary center comprised of designers and engineers, animators, visual artists, and related personnel working in advanced computing and all working within a collaborative research facility that includes open, reconfigurable classroom, studio, and performance space equipped with high-end computing equipment. The collaborative also included people from Art Education, Business, Design, Theater, Computer Science and Engineering, Architecture, and English, among others. Additionally, the project included nationally and internationally recognized artists, designers, and scholars and alumni working in industry and as independent artists and designers.

In consultation with the group, Zuniga Shaw developed a framework for collaboration designed to promote working across disciplinary boundaries with goals of fostering deep thinking, creative play, and ultimately the creation of proofs-of-concept that demonstrate how we might utilize emerging technologies in more humane ways. Throughout the initial year

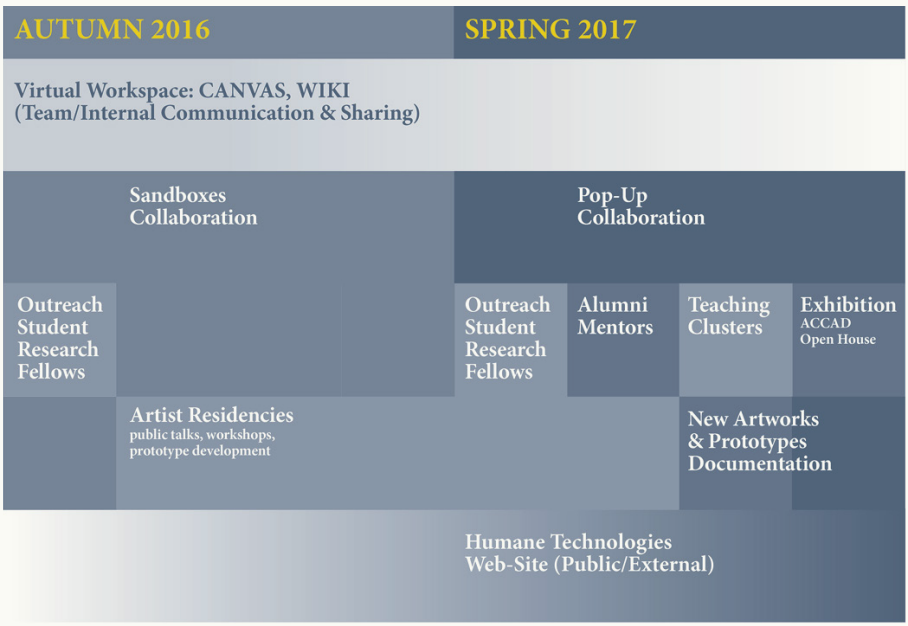


Figure 2. Timeline of the events and activities conducted by the Humane Technology collaborative during the first year.

of this project, a number of components, both formal and informal, served as scaffolding for the collaborative (Figure 2). These include:

Preliminary discussions, reflections, and resource sharing in a non-public forum via our university's Learning Management System;

1. Teaching clusters, an approach to curricular collaboration that does not require fully overlapping but instead targets opportunities for shared guest lectures, 1 or 2 days of team-teaching and student engagement during the Pop-up week with the goal of refining research questions, sharing references, and building collaborative relationships as well as interdisciplinary research outcomes;
2. Sandbox Events (Figure 3), another facilitation model where selected groups of experts (no more than 8 or 10 people) meet with faculty lead collaborators to explore specific research questions in given technological frameworks and develop and refine those questions together;
3. Artist residencies and public talks with substantive time for working together to inspire new thinking, catalyze research and develop prototypes with faculty and students;

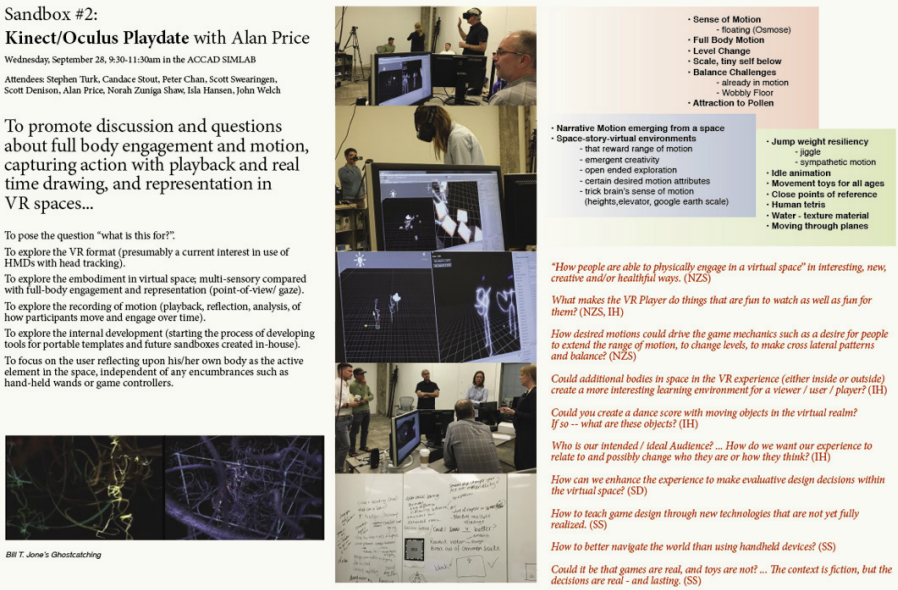


Figure 3. A summary report sheet of Sandbox 2, one example of the various kinds of process documentation developed during the entire project.

4. Pop-Up Collaboration, a concentrated collaborative art and design event where breakout teams would develop prototypes of technological applications;
5. A series of post-project deliverables (e.g., a public open house event at ACCAD demoing projects developed during Pop-Up Week, conference presentations, journal articles, a cumulative online publication documenting the process, written blog posts for a public project website humanetechosu.org).

The centerpiece of the Humane Technologies framework is the week-long Pop-Up Collaboration, which is intended to promote robust technical and creative experimentation among team members. Unlike more traditional research projects, which typically rely on long-term development and contemplative modes of thought, Pop-Ups are intended to be models of emergent art, design, research, and scholarship, coming and going in a comparatively short life cycle with teams organized around common research questions with a goal of rapid creative output. Thematically driven by an instigating question posed by design thinker Bret Victor – "What might it be like to communicate, to work and to think in home humane dynamic mediums?" – Pop-Up stakeholders work together to articulate what a future of humane technology might look like by developing prototypes that foster new modes of connection, embodied learning, and creative expression that utilize the more immersive and interactive technologies mentioned above. As originally outlined in the Humane Technologies grant proposal, we anticipated deliverables such as: "diagrams and infor-



Figure 4. A visual breakdown of the Pop-Up Week's timeline and schedule of events.

mation visualization, short films, digital and physical games, written evaluation and reflection, visual or performance artworks, gaming rule sets and environment designs, physical simulations of virtual mediums, scripts, and storyboards" (p. 7).

At the time of this writing, the group has completed one Pop-Up Week (Figure 4) on the first year's theme of Livable Futures, and will convene the year-two Pop-Up on the theme of Wellbeing. In the following section, we highlight three case studies of projects imagined and developed during the first Humane Technologies Pop-Up collaboration, detailing the dynamic creative and intellectual processes that led to their creation.

3. Pop-Up Week

During the course of the project's first Pop-Up, one breakout team (comprised of three faculty members with background in Visual Communication Design, English, and Arts and Anthropology) was charged with the task of observing and documenting how interdisciplinary teams formed, galvanized, and worked within their respective interest areas – from the brainstorming and conception stages to the prototype and feedback stages and beyond. This process documentation team subsequently examined the activities of the various groups with a goal of not only describing, but also theorizing how the groups tended to function collectively.

The collaboration week started with six Pop-Up project leaders presenting their initial research questions and technology frameworks. Each project leader conducted a six-minute Micro Talk provoking thoughts and generating discussions (Figure 5). The project topics ranging from movement experience in VR, physical and virtual worlds for work and play, object-oriented ontologies, to multisensory and multiuser collaborative workspaces. As Zuniga Shaw notes, it was anticipated that projects would develop and evolve specifically because of the organic dynamic of the collaborative experience:

> "These may be distinct projects or they may morph into each other. The idea is that we all dive into full-time work together in parallel and while some are leading specific efforts, there are set teams, everyone will be looking for how they add value and what they can contribute to each project (which may be as simple as feedback, or more involved like coding or building 3D models or performing) as the projects emerge we will get inspired by each other."



Figure 5. Visual breakdown of activities during the first day of Pop-Up week.

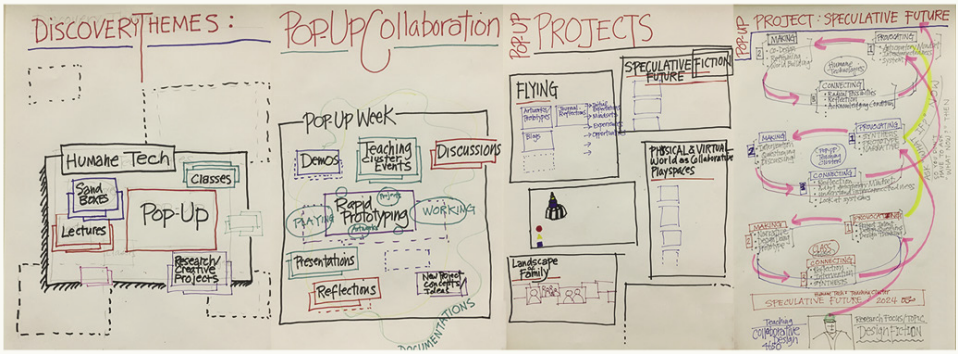


Figure 6. A visual summary and graphic diagrams developed at the final day of Pop-Up week.

The collaborative activities for the remainder of the week were various groups of Collaborative Play/Working integrating with 8 Teaching Cluster events involving 12 faculty contributors and researchers, 5 alumni, 5 graduate assistants, 4 undergradute student research fellows, and students from 8 associated courses (from disciplines including Art, Design, Dance, English, Spanish and Portuguese, Theater, and Women's and Gender Studies). The project teams shared their prototypes and outcomes on the final day of the Pop-Up week. The collaborative week was concluded with reflections from contributors and summary report from the documentation team (Figure 6).

Generally speaking, the teams that emerged during the Pop-Up collaboration worked toward their respective goals within a somewhat dialectical structure, wherein initial ideas and concepts were subsequently reshaped given certain emergent affordances (e.g., the synthesis of disci-

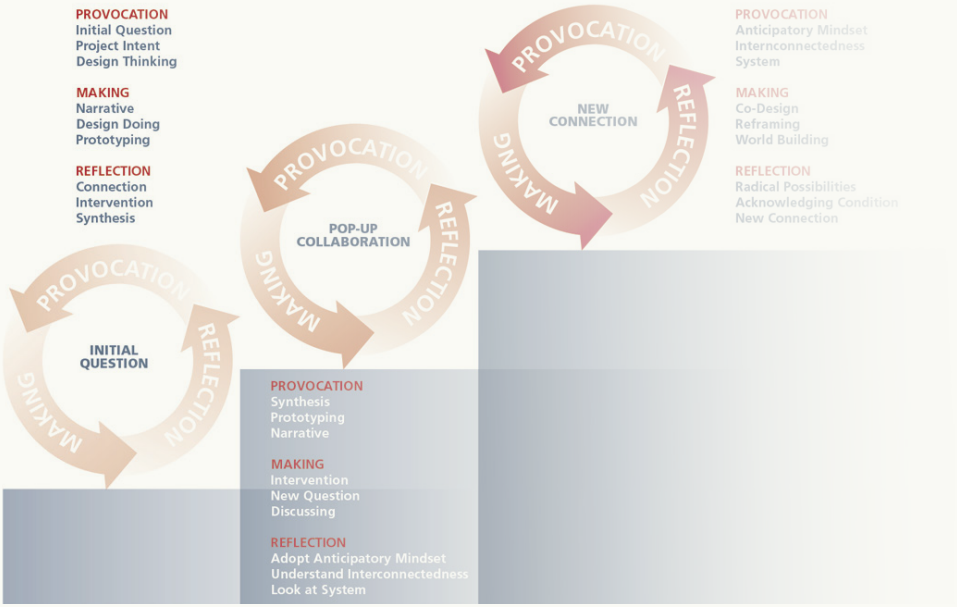


Figure 7. Graphical depiction of the "Provocation, Making, Reflection" collaborative model at different stages of the project.

plinary knowledge, serendipitous discoveries during play, the introduction of new members, etc.) and constraints (e.g., technical limitations, time crunches, unavailability of team members). In short, we recognized a common structure operating more or less in parallel across the various teams, one that we term the "provocation, make, reflect" process, as depicted in Figure 7. In the following subsections, we articulate how this process developed within three separate case studies.

This paper highlights three of those projects exploring the theme of livability in the 21st century during the Pop-Up Collaboration: Birdbot, Method of Loci, Digital & Physical Games. An overview of their "Provocation, Making, Reflection" process is presented here based on their written and visual summaries that were developed internally on our virtual workspace in the university's LMS and then revised for the more curated process blog.

3.1 Case Study: Birdbot

Users rise through virtual worlds and make music with their wings while achieving balance challenges in this Virtual Reality simulation (Figure 8).



Figure 8. Birdbot, Team members – Alice Grishchenko (Design, team lead), Alan Price (Design), Isla Hansen (Art), Mari Palazzi (Design) and students in her graduate design studio course, Norah Zuniga Shaw (Dance/ACCAD).

Provocation. The premise that eventually gave rise to Birdbot is that livable futures should include bodily awareness and movement should be an important part of having fun in computing environments. This project started out by playing several virtual environments as a way of exploring the technology's potential to engage users in ways that are both physically and emotionally impactful. The goal, according to team lead, was to create the kind of experience that would encourage users to move around in and explore VR space more fully (rather than, say, the comparatively still, waist-up movements typical of VR games). The project initially began to take shape during a Sandbox event earlier in the year, where team members realized they had a shared interest in researching full-body interaction in VR, something beyond even gestural interface design.

Making. Using the Oculus Rift Virtual Reality system combined with a Kinect and projection, this experimental VR project transforms the user into a heron who flies through a series of "compassionate" landscapes that include artifacts such as family photographs from project members, calming windchime sounds, and gentle lighting. As the prototype for this team developed during the week, team members drew upon their disciplinary backgrounds when contributing ideas to the simulation's overall design, user interaction, and mechanics. Less of a game and more what the team refers to as a "movement toy," Birdbot allows users to navigate the virtual landscape in an unconventional, but not overly challenging, manner: balancing on one leg initiates flying, for example.

Reflection. As relayed by the team lead, members described the process as overwhelming, but ultimately satisfying, emphasizing the interplay of

different intellects and creative direction. The development of Birdbot was not simply an exercise in visual design, but one that emphasized ways of moving within that visual environment and building a world from movement (rather than more typical starting points of story or visual goals). Additionally, the incorporation of various physical props (e.g., PVC and fabric wing harness, puppets, and other artistic embellishments) offered new opportunities for thinking about how users are situated within virtual and augmented spaces and moving toward genuine mixed realities. While not every idea was fully implemented by the week's end, the chance to experiment and play-test different features with faculty and students has suggested their potential for future development. Uninterrupted attention also allowed for rapid advancement of the prototype to ready it for the public play tests of the Open House events that followed the Pop-Up. The public responded well to Birdbot, laughing at how hard it is to balance in VR, flapping their arms and doing a lot of gross motor movement (a goal of the project) and overall suggesting the value for further research and creative production of virtual worlds that are physically engaging for fun and wellness. This project is in conversation with work being done on VR for athletic training, games for health, positive computing and other allied fields.

3.2 Case Study: Method of Loci

Users navigate a collaborative mnemonic space in which items are mentally associated with specific physical locations in this hybrid VR and multitouch panel application (Figure 9).

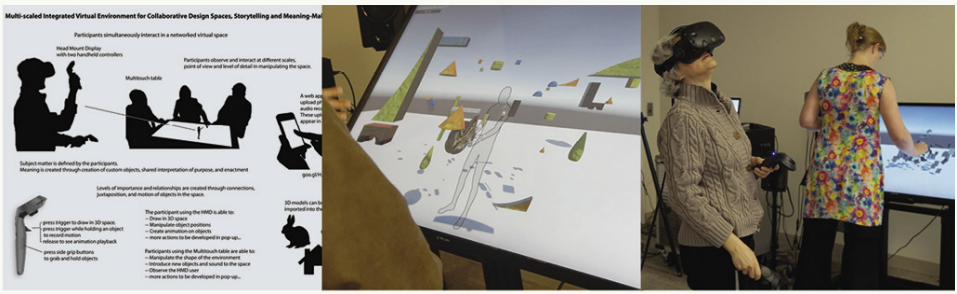


Figure 9. Method of Loci, team members – Alan Price (Design, team lead), Isla Hansen (Art), Scott Swearingen (Design), Michelle Wibbelsman (Latin American Indigenous Cultures), Ben McCorkle (English), Norah Zuniga Shaw (Dance/ACCAD).

Provocation. This team set out to explore the affordances of combining interfaces for collaborating in immersive VR environments. The initial goal was to develop a two-person, two-mode VR interface that highlights differences in scale and perspective, engaging users in a process requiring collaborative navigation and communication across modalities.

Making. Combining the HTC Vive Virtual Reality system (which includes an HMD, hand controllers, and motion-tracking sensors) with a multi-touch display, this project creates an interactive immersive space that functions as a kind of externalized mnemonic system where items in that space can be positioned and manipulated. The VR headset and multi-touch display allow for collaborative interactions between two or more users. Users can take pictures and record sounds and easily upload them into the networked VR and touchscreen displays. Once these artifacts of the physical world are uploaded into the virtual word the users can then use the Vive controllers to re-arrange them, animate them, draw and write around them and change the overall environment.

Reflection. The technical question of combining input modes initially drove this collaboration, but it quickly became apparent that the team needed to provide content and context for the VR experience. Discussions of scale were frequent suggesting opportunities to develop the work further given that the user in VR has a first-person point of view and is immersed while the collaborator on the touchscreen has a bird's eye view. The emergent concept driving that development was memory. What began as an idea inspired by the medieval rhetorical tradition of creating artificial memory systems design to deliver an oration evolved into something more dynamic and communal, emphasizing cultural rather than individual memory. During the Pop-Up week several participants started to curate their own object collections and design experiences for others to then move through. Drawing on one team member's research into indigenous culture, the space was populated with scanned artifacts that carry cultural significance as a way of creating a sense of community and encouraging more sustained engagement and up-close examination of ancient artifacts.

3.3 Case Study: Digital + Physical Games

Player dodges emerging obstacles by working closely with a partner in this motion-tracking, ceiling-mounted projection game prototype (Figure 10).

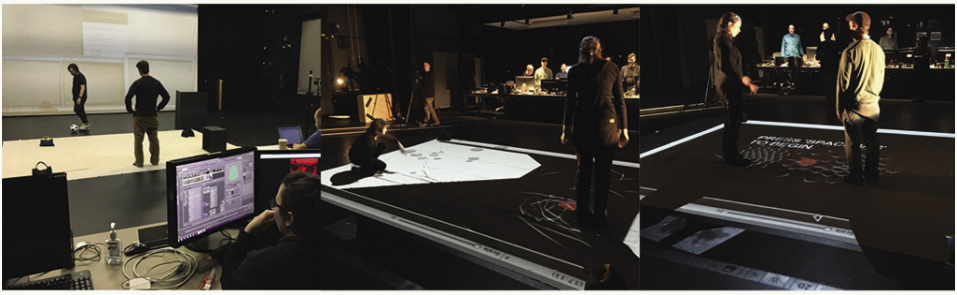


Figure 10. Digital + Physical Games, Team members – Scott Swearingen (Design, team lead), Scott Denison (Design), Ben Schroeder (Alumnus), J Eisenmann (Alumnus), Matt Lewis (Design), Alex Oliszewski (Theater), Sarah Lawler (Design), Norah Zuniga Shaw (Dance/ACCAD).

Provocation. This project was ultimately an experiment in fostering cooperation through gameplay involving verbal and nonverbal methods of communication. From the outset, this team planned to investigate the intersection of physical and virtual presence within the context of games, an emergent theme of all of the Humane Technologies research. While 'play' offers the individual an opportunity to learn about themselves and others, 'games' provide the necessary structure to make our choices meaningful and give weight to our capacity for empathy. Furthermore, by integrating physical and virtual presence in this framework, we can streamline our ability to abstract relationships within a given system, and hence, one another.

Making. This game prototype is programmed in Unity and uses Microsoft Kinect combined with and a ceiling-mounted projector. Two players move through a scrolling landscape and have to coordinate their actions in order to avoid emerging obstacles and barriers (I.e., player actions are interdependent). Crouching, jumping, and lateral movements are essential to gameplay.

Reflection. This team deliberately sought to keep mechanics simple and maintain a really small design footprint to stay agile, and to focus on contributions of team members. Throughout the Pop-Up, this team sought broader investment from the entire collaborative by soliciting faculty, students, and staff for their ideas. It was also the only team that conceived of, developed and completed the project entirely in the 5-day period of the Pop-Up.

4. Conclusions, Implications, Reflections

Research and education in the 21st century requires not only deep investment in our core competencies and the emphasis on creativity and critical thinking that have long been strengths of the arts and humanities, but also an increased emphasis on collaboration, digital and global literacy, and student-centered learning that is enhanced through engagement in research. The Humane Technologies Collaboration is in many ways the practical manifestation of these ideals. As mentioned earlier, this paper focuses on the task of mapping out the terrain of a successful arts-driven interdisciplinary research collaborative. While our subsequent work in this area will analyze the theoretical implications of the content developed during this project, this paper serves as a template for how others might think of structuring a similar multidisciplinary research collaboration given the affordances and constraints of their own institutional settings.

Given our particular focus on the Pop-Up Collaboration and limited space within which to write about it, this paper provides only a certain degree of expanded context. It is meant to be, rather, a preliminary or high-level overview of how impromptu teams of collaborators draw upon their diverse intellectual backgrounds when coming together during shared experiences in order to rapid prototype interesting projects. While technical expertise is necessary for non-trivial development tasks (e.g., coding, hardware interrelation, etc.), the bulk of the concept-building and creative design was shared by multiple members comprising a wide-ranging skill set – the process across all teams was dynamic, organic, and represented a true synthesis of disciplinary knowledge and collaborative, goal-oriented creativity.

Recognizing that collaborative opportunities depend on circumstances such as institutional affordances and constraints, individual make-up of team members, access to and availability of tools and technology, and myriad other factors, we contend that there are nonetheless transferable lessons to be gained from these case studies. Essentially, we describe here an effective process that is comprised of a number of discrete steps (with, admittedly, some overlap and recursion): preliminary occasions timed well in advance of the work session where team members can explore available technologies, discuss core research questions and goals, and begin cultivating concepts; dedicated and concentrated time, space, and resources to mock up initial concepts; multiple opportunities to play-test and reflect upon progress, direction, problems, and so on.

We close this paper in the spirit of the collaborative work undertaken throughout the Humane Technologies project, by inviting opportunity for reflection. The authors offer herein their perspectives of the collaborative process as they have witnessed it, as participants as well as observers.

Chan: With my background as a visual communication design educator whose practice focuses on Collaborative Design, I've been interested in the method, techniques, and approaches design students learn to explore, interpret, and apply design thinking and doing to complex design problems in a team practice setting. As an investigator for the Humane Technologies Collaborative project, my work on documentation and facilitation methods was essential to this interdisciplinary collaborative effort. I characterized the collaborative processes and patterns with system diagrams and visual metaphors to help clarify the methods and identify a typology of collaboration, which could function as a road map of the collaborative terrain, the unfolding paths and dynamic network of interactions. The basic approach, inspired by Poggenpohl's Design Integrations (Poggenphol 2009), guided me to capture and model these collaborative activities by focusing on the following characteristics: who are the participants and other stakeholders; what they are doing (provocation); how they are doing this (making); and why they are doing this (reflection).

The Pop-Up week provided me the opportunity to observe, document, and somewhat engage with different levels and complexities of collaboration. What I learned from this experience will allow me to engage more effectively and efficiently in other collaborations and during our next Pop-Up. Overall, as an engaged design educator constantly searching for a "growth mindset" (Dweck 2016) through exploration and collaboration, I feel the Humane Technologies Collaboration allows everyone in the team to gain a broader view of the topic, to embrace challenges, to play and enjoy the exchange and sometimes also to endure difficulty and obstacles, take in unexpected ideas, make mistakes, and to seek out help and support.

McCorkle: As a specialist in rhetoric whose interest lies in exploring how technologies have shaped our communication practices throughout history, I've been trained to explore these questions from a position that's somewhat outside and above the immediate action. At the same time, the Pop-Up event offered an opportunity to engage with creation, production, and play using those tools, so I simultaneously occupied two roles as par-

ticipant-observer. While initially I was focused on the technologies themselves, the instruments that facilitated these collaborations, I adjusted my focus to pay more attention to how the participants interacted with one another using these technologies. Surrounded by a technological infrastructure of VR rigs, 3-D printers, interactive touch displays, and projectors, it's tempting (and perhaps even understandable) to forget about the actants, the human agents, that use that infrastructure. I found myself watching how bodies circulated during the week: frenetic, chaotic, playful, eventually leading to emergent patterns and deliberate purpose. The open layout of the ACCAD studios facilitated this movement, where people working diligently on one project would be pulled into another for some quick feedback, then to another to help with a demo. Classes would move in and out of the space, students contributing to the tasks at hand.

As the process documentation team discussed our observations during the week-long Pop-Up, we tended to use metaphors, symbols, and imagery that reflected the dynamic: the double helix structure of DNA, Chinese ideographs depicting "tree" and "forest," pictures of a copse of trees, an individual tree with serpentine root structure, imagery of tornados, and Robert Smithton's earthworks sculpture The Spiral Jetty, among others. This spiraling imagery is not just a metaphor, but a way of mapping the collaborative creative activity of the Pop-Up. In other words, this movement of bodies not only reflects on a symbolic level how ideas emerge, change, lead to creation, it is quite literally a key mechanism by which they are formed: hands type and push buttons to change code, arms wave in the midst of gameplay, whole bodies undulate in the service of performing a dance routine. Witnessing – and even participating in – this whirlwind-in-a-snowglobe, I realize that this dynamic is at play when we scale up to consider culture at large. The problem is, we don't always recognize that; perhaps the solution lies in deliberately attempting to bring about those moments of recognition more clearly and more often.

Peter Kwok Chan
Associate professor of design,
Ohio State University, USA
chan.179@osu.edu

Ben McCorkle
Associate professor of English,
Ohio State University, USA
mccorkle.12@osu.edu

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Digital Craftsman
Innovating by Doing

David-Olivier Lartigaud

Abstract

Innovation is the "raison d'être" of R&D laboratories within companies, and digital technology is probably the richest and most promising sector today. In a digital design laboratory, located in an art school, the motivation is elsewhere: it's a way to built an alternative thought, different than those explored by industry and engineering. By moving away from a pragmatic framework, research in design can be free from all expectations and presuppositions and thus opening up a wider field of answers and solutions. Yet, as designers, it is legitimate to ask the following question: must a designer be an innovator or a creator? In this way, our approach – more than a method – of digital craftsmanship tries to combine these two postures by a fine and applied knowledge of the digital domain. The position of creator – or inventor – here is not overwhelming, it is that of a know-how at the service of a problem to be solved. In our time, "innovation" is not expressed any more in these terms when thousands of designers, makers and amateurs aspire, at different levels, to transform the socio-economic landscape of our in crisis society of its capitalistic model.

Theme: Innovation
Keywords: design, digital craftsmanship, innovation, creation, alternative

1. Introduction

Innovation is the *raison d'être* of companies' R&D labs, and digital technology is probably the most dynamic and promising sector today. For our digital design lab, located in an art school, motivation is elsewhere: it is a way to build an alternative design thought, different from those explored by industry and engineering. By removing constraints of immediate benefit or economic risks – to which most companies are bound – research through design can free itself from all the assumptions and the expectations of the industrial world and thus increase the scope of investigation. This should create favourable conditions for the fundamental research with, however, possible risks. In this privileged context, theoretical and practical productions risk to become "above-ground" ones, leading to the results that are not rooted in reality or else projected into such a far-off future that they no longer have any link to our present-day concerns. We

try to avoid this shortcoming by going beyond the concept or use scenario in order to develop functional projects.

In order to be considered as successful, an innovation must find its market. However, the projects developed in research through design labs, especially in art schools, privilege other criterion in the field of invention and creation. The success of projects of research through design institutions is not measured by the number of consumers but by the consistency of the result, which should, if possible, advance the state of research in a chosen field.

Yet, it seems paradoxical for designers to completely ignore the innovation issue. It is therefore legitimate to ask the following question: must a research through design integrate commercial questions? In other words, should a designer be innovative or exclusively creative?

Based on this brief problem, we would like to present the work of our design research laboratory at the Higher School of Art and Design of Saint-Étienne (ESADSE). Indeed, although we never use the term innovation to describe our projects, some external observers consider them from this point of view. Paradoxical as it may seem, our approach is more progressive and more concrete than the expectations of innovation. Of course, we do not create projects aiming to meet immediate needs and we do not work on specific orders or solutions creating new markets. We also wish our research to remain artistic, aesthetic or at least critical; for us, this is a deliberately "abstract" field of investigation making us dependent, above all, on conceptual constraints. This means our work is prospective but not devoid of material reality. Indeed, in most cases, the projects result in functional prototypes if not finished objects. As such, they require the solution of concrete problems related to formal development, user experience, electronics, programming and mastery of sometimes complex tools (3D printers, robotics, numerical control machines, etc.) also demanding many other skills necessary for the construction of projects integrating digital technology.

That is why we define ourselves as a "digital craftsmen". The notion of digital craftsmanship means the desire to be close to the medium as much as certain code and software related "work", collaborative and relevant to research in the field if possible. The position of creator – or inventor – here is not overpowering, but translates through know-how serving a project. Nowadays, when thousands of designers, creators and amateurs aspire, at different levels, to transform the socio-economic landscape of our society into a crisis of the capitalist model, the term

"innovation" is no longer just about economic issues. Policy, environment or awareness of digital issues are criterion at least equally important for assessing the "innovative" nature of a project.

After a brief presentation of the Random (lab), we will illustrate this with some of the projects implemented during these last years. Obviously, the intention is not to set our practice as a model, but to show it as a possible way of research. In the following lines, we will not tend to present these projects from the point of view of innovation, but as a contribution to the innovation debate within the of the Cumulus days framework.

2. Open Research in Art, Design, Digital and Media – Random (lab)

The Random (lab) at the ESADSE is a place of practical and theoretical research dedicated to experimentation in art, design and digital technology. Open to students in 4th and 5th years in art or design, post-diploma students and guest researchers, the Random (lab) is located within the digital practices platform of the ESADSE. It includes a resource centre and a workspace for prototyping interfaces and interactive installations from Arduino electronic components and platforms. The speakers and students associated with Random (lab) also benefit from all the ESADSE's digital pole tools, both software (3D, graphics, etc.) and hardware (Stratasys 3D prototype, Ultimaker 2 printer, Epilog laser cutting machine, CNC Vslot, etc...).

The Random (lab) together with the NRV laboratory of ENSBA Lyon, forms the ESADSE-ENSBAL digital research unit.

As mentioned above, the Random (lab) uses the project practice as a basis for the research, referred to as research through design, unlike design research as it is practised in the academic context.

The research method within the Random (lab) can be broken down into the following steps:

- preliminary documentation work followed by analysis of existing productions equivalent to a more or less in-depth "state of the art" depending on the importance of the project (in terms of hourly and budgetary involvement);
- understanding the specific issues in the research area addressed and problematizing according to the data provided by the state of the art;

- experimentation and confrontation period with technical modelling, of different duration depending on the complexity and number of partners involved in the project;
- creation of a functional prototype or a final “object”.

This methodological progression aims to obtain a concrete formal and/or analytical result that will then be disseminated in various ways: material (exhibition, fair etc.) or immaterial (online presentation, publications, conferences, etc.).

Theoretical or methodological aspects may also give rise to more academic publications (review articles, participation in symposia, etc.).

The aim of this work is not to understand, reproduce or limit ourselves to known processes, but to go beyond them, towards experimental areas that allow us to propose, open up, or even redefine new areas of reflection and experimentation in art and design. The singular approach tried by the Random (lab) is obviously itself questioned and will be refined with experience.

We will now turn to someproduction examples. In the following four presented projects, we shall identify the initial issues, the conceptual and technical aspects and, finally, give a critical feedback on experience.

3. *Monolithe* (2013-current)

Monolithe is an interactive work co-produced by GRAME (CNCM) and Random (lab) for artistic exhibition venues. A visual, interactive and musical object, it is the result of a process of exchange and formalization in such diverse fields as design, musical composition, programming and engineering, associating the composer Vincent-Raphaël Carinola, the Random (lab)-ESAD Saint-Étienne and the GRAME (Lyon). In development since September 2013, the *Monolithe* project has gone through several variations and is still a research subject.

3.1 Project Description

Monolithe is a musical and interactive installation ready for dialogue with the spectator. When the visitor touches the surface, it reveals its “moods” and “sensations” through sounds and lights.

When not solicited the object is animated by its own life provoking the appearance of discreet light and sound effects, but when “awakened”

by a visitor, it resonates with the visitor's gestures and resembles an "instrument" allowing to produce sound phenomena and musical sequences.

The *Monolith*, however, is not a docile interface that obeys all stimuli. It installs a singular dialogue that forces users to gradually tame it.

Exhibited in various art and design venues (Biennale Internationale Design Saint-Étienne, Centre d' art contemporain A4 de Chengdu, D' Days Paris, LUX de Valence, etc.), this project has undergone through various modifications in order to constantly improve its interaction with the visitor.



Figure 1. Monolith, Random(lab)-ESADSE (Johann Aussage, Damien Baïs, François Brument, David-Olivier Lartigaud, Jacques-Daniel Pillon), Vincent Carinola et GRAME/Christophe Lebreton.

3.2 Visual Aspects

Monolithe is a vertical object in the form of a triangular prism. Its structure, made of black lacquered metal, is covered with dark grey glass plates. The inner space of the *Monolithe* contains a matrix of leds whose luminosity passes through the glass without making it possible to distinguish the interior of the object, to create moving halos that provokes spectator's perceptual disorder. The relatively big size of *Monolithe* (90 cm wide by 250 cm high) and its materials (glass/metal) make it a sculptural element with an assertive spatial presence.

The LEDs inside the object are managed by a program of boids type, developed by Random (lab) under Processing, which gives the impression of an organic mass, animated and coherent (like a cloud of starlings) inside the object. The capture of the visitor's gestures has been the subject of multiple versions (by sonar, resistive system, and currently with a Lidar) in order to constantly improve the precision.

3.3 Sound and musical aspects

The metal structure incorporates 36 loudspeakers and a subwoofer, plus three "buttkickers" that create slight vibrations on the glass.

The musical production for *Monolithe* takes place on three levels: a sound environment occupying the object space, its internal pulsation and the sound forms resulting from the interaction with the audience or, in the case of a performance, with an instrumentalist or choreographer.

The three surfaces of the *Monolithe* allow capturing a variety of actions: placing or removing one or more hands, rubbing or caressing, sliding at different speeds. Each manipulation is interpreted by a program created with MaxMSP that generates, transforms and broadcasts the sound result on the 39 channels integrated into the object. The three surfaces operate independently

Monolithe allows two types of listening: on the first results from the action on its surface, emerging perennial and furtive sound forms, zebra accented by the movement of leds. Another one, contemplative listening, allows perception of slow-pulsed evolution of different materials, the whole constituting a frame/memory of past gestures.

3.4 Visual/music/spectator relationship

As part of the *Monolithe* project, music and visuals are designed in tandem aiming to develop a fluid and coherent language. The final ambition is to obtain a harmonious gestural, formal and sonorous logic that allows the viewer to understand the interactivity, going beyond the simple requirements of efficiency of a sensitive surface. The idea is not to develop yet another tactile slab, but to create the conditions for a new aesthetic experience between the pleasure of learning to play a new instrument and the discovery of an unknown life form.

Through the fusion of gesture capture, electronic lutherie, programming language and visual dynamics, *Monolithe* is at the same time instrument, score and show. The stake of the project is creation on these particular various levels of interactivity, from the discovery of the object (visitor) to its potential use by an expert (musician, choreographer...). In a sensitive way as a contemplative and interactive object in its relation to various types of public, the *Monolithe* project raises multiple questions on our relation to an interface, or even to an artificial intelligence, even if the behaviour of the object is very simple compared to current deep learning research. In other words, if the project is not directly “useful”, it shows interest in investigating the domain of the sensitive as a testing ground for the “user experience”.

4. Data Collector (2016)

The Data Collector is a connected vest and hood designed to collect environmental data in collaboration with the research division of the Cité du Design de Saint-Étienne. This project was funded by the Avenir Lyon Saint-Étienne Program of the University of Lyon, within the framework of the "Investissements d' Avenir" program (ANR-11-IDEX-0007).

Designed as an alert tool, this "intelligent" garment is worn by a "scout", i. e. a person wishing to get involved in monitoring the quality of his environment.

The Data Collector's specifications are multiple. It consists of:

- propose a tool for nomadic measures;
- provide statistical and measurement references on a site;
- produce analytical elements on a data set;
- share knowledge on a natural, rural or urban environment;
- inform citizens and encourage them to act and change their behaviour.

In the prototype version, the vest carries relatively simple sensors, but more powerful and even expert versions can be considered in order to transform the scout into a real mobile collection laboratory. Depending on the versions, it is also possible to imagine that the Data Collector can operate in various and even extreme climatic conditions. The electronics used for this prototype are linked to an Arduino and the low-cost sensors are easily available for purchase on the Internet; the whole is connected to a mobile phone that displays the data. This choice of a "low cost" technology is essential in the production logic of these clothes connected in fab lab type spaces so that they can be easily diffused and used.



Figure 2. Data Collector, Random(lab)-ESADSE & Pôle Recherche Cité du Design. Project made with Camille d'Arondel de Hayes et Chloé Pelletier, students in Medias design, ESADSE.

The Data Collector has an ability to cross-reference live data and can make the matching of some of these data readable via a telephone interface. The "automatic" mode of the

Data Collector triggers the sending of tweets (via smartphone) to a dedicated account when a significant threshold is reached by certain sensors. The "scouting" mode allows the bearer to send information or reports on the network whenever he/she deems it useful. In all cases, all data collected during a mission is recorded and stored for future usage if necessary.

The Data Collector is not a harmless garment that the wearer wears on a daily basis. It is a device intentionally brought up within the framework of "mission" that the scout will have fixed itself as, for example, that of scanning a part of a territory, known or already referenced, in order to increase or refresh its data. The scout will be able to leave alone or in groups to increase the relevance of the data collected. Indeed, the simultaneous gleaning of significant data by a dozen or so vests will be more likely to reach the exact measurement than an isolated vest.

Nevertheless, the Data Collector does not have the value of scientific or even legal proof. The alerts resulting from the Data Collector are to be considered as starting points for a true scientific analysis involving financial means to be implemented that are inaccessible to "scouts". It is therefore above all a critical object designed to give a sensitive and objective reading of the environment.

In addition to working on the prototype, the Data Collector gave rise to a series of study days allowing to invite specialists such as Laurence Allard, Thomas Bizet, Martin Grandjean, Wouter Van Den Broeck...

5. Digital craftsman and *Objectiver*

3D printing, laser cutting, digital milling, electronic prototyping... These machines and techniques related to digital technology burst into the designer's daily practice in the mid-2000s, unlike the 2D or 3D design software used for decades. There are several reasons for this time lag. Numerically controlled prototypes and machines were known and used in the past in industry but, due to their high cost, they were reserved for professional and specialized access. However, in recent years, a cluster of technological and societal changes has led to the emergence of machines that are cheaper and often easier to use, accompanying the development of design practices anchored in digital technology, both by professional habit (use of 2D and 3D software implanted in usage) and culturally (open source, fab lab...). However, 3D printers and other "office" digital machines coexist with their industrial counterparts, such as the

computer that entered the amateur world as a “micro”-computer in the 1970s, then in households in the 1980s, while continuing its development on the scale of the “super”-computer. From now on, the designer can have several types of tools at his disposal in a gradation of possibilities; he can use, in his projects, both industrial machines and their “personal” version, for prototyping and production purposes. It is also in this sense that the digital practice of design is closer to that of the craftsman.

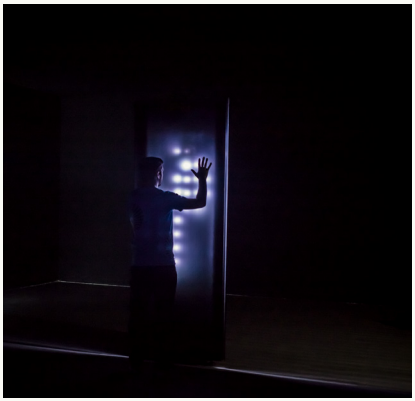


Figure 3. Digital Craftsman, Random(lab)-ESADSE, work in progress during a workshop.

Material and practices are strongly linked, in a series of transformations and reciprocal adjustments that lead to a progressive transformation of creation, design methods and, therefore, design work. Based on this observation, the *Objectiver* line of research began with inviting practitioners, theorists and students to reflect on these new challenges inherent in the practice of contemporary design.

In line with these researches, a biannual workshop entitled “digital craftsman” was held at ESADSE in order to train students in this practice as close as possible to the digital “medium”. From this “craftsman” perspective, we can cite the experiments in 3D ceramic printing. In fact, modelling, moulding and pottery turning are traditional techniques that create and imply aesthetic typologies and constraints. What happens when you model a shape and it is done by depositing a digitally controlled earth bead? We introduced this questioning and invited students to imagine, model and make objects exploiting the possibilities of this new technique. This workshop was open to design students who have an advanced master’s degree in 3D modelling software (Rhinoceros, Blender etc...), allowing them to work on complex shapes. Therefore, current problems and skills are mobilized although the theme is based on such an ancestral practice as pottery. The idea is not to focus on ceramics but to allow students to acquire creative and technical skills opening the possibility to intervene in projects by mastering the digital chain. The approach is therefore formal but also technical, conceptual and responsible (ecological and ethical issues).

These examples give a glimpse on the heart of our approach. The issue of innovation, in its economic context, is only part of a problem as we see it. Innovation through “doing” is above all a means of designing projects anchored in their medium, capable of providing a realistic and optimised response due to the iterative process at the basis of their conception.

(Thanks to Vincent Carinola for his participation in writing the *Monolithe* project section.)

David-Olivier Lartigaud
Teacher in digital art/design,
Head of Ramdom(lab) – ESADSE,
Saint-Etienne, France
david-olivier.lartigaud@esadse.fr

Finding a Wellspring

A Curricular Initiative Developing Interdisciplinary Innovation as an Agency for Wellbeing

Peter Martin, Byrad Yyelland

Abstract

Innovation as an idea is often regarded within university curricula to imply an imperative for post-secondary education to engage students in the creative pursuit of technological solutions to complex social and environmental problems as well as enabling them to achieve a certain job market relevance. This narrative is based on the notion that innovation is a creative capitalization of new technologies within emerging trends. This view is perhaps the 21st century's revival of Alfred Whitehead's assertion that the 19th century's most significant invention was the method of invention itself.

However, if we investigate the intentions brought to these two "movements" of creative capacity we can begin to extend university students' consideration of innovation beyond a utilitarian and pragmatic scope. What if post-secondary curricula were designed to resituate innovation within individual and teams of students as opposed to confining innovation to an external field of issues and potential? What if university education was to conceive of innovation as a form of agency to be cultivated as an intent within individuals to be activated as an interdisciplinary practice rather than it being acquired as a purely entrepreneurial method?

This paper introduces a curricular module being piloted to engage students from multiple universities in an examination of well-being that leads them into an interdisciplinary collaboration to innovate an initiative for wellbeing of self and society. This module is organized around a sequence of three objectives: (1) To develop through a critical and reflective process a student's conception of wellbeing, understanding of an intersectional array of its determinants, and a clarity regarding the associated values within the contexts of daily living and the arc of his/her life; (2) To synthesize the values, interests, and skills of students of multiple disciplines into a collaborative project to innovate a wellbeing initiative; and, (3) To apply a design thinking oriented collaborative process as an interdisciplinary team to innovate the philosophical, technical, and social goals, objectives, and initial prototypes of a wellbeing initiative to be of pursued as a "spin-off" following the course. These initiatives could be a community project, product or service concept, approach to self-care, conference proposal, research project carried out as a future course of study, or other proposed strategy of achieving an innovative agency of facilitating wellbeing.

This module is pursued as an integrative and appreciative contribution to the current transition of post-secondary education from operating as siloed disciplines seeking specialized and transferable knowledge towards functioning as an interdisciplinary platform of generating transdisciplinary and situated practices. By providing a qualitative narrative and assessment of the module's objectives, syllabus, and pedagogic methodology this paper aims to illustrate how and to what extend might a university course foster innovation as a form of agency by deepening the intentions of students through an orientation to wellbeing and broadening their capability through interdisciplinary design collaboration. This review of the module's design is organized to generate a functional rubric with which to guide and evaluate the iterations of this module and other similar curricular initiatives.

Theme: Innovation
Keywords: agency, innovation, interdisciplinary collaboration, post-secondary curricula, wellbeing

1. Introduction

Innovation as an idea is often regarded within university curricula to imply an imperative for post-secondary education to engage students in the creative pursuit of technological solutions to complex social and environmental problems as well as enabling them to achieve a certain job market relevance (Lucas & Goodman, 2015). This narrative is based on the notion that innovation is a creative capitalization of new technologies within emerging trends (Staley & Trinkle, 2011). This view is perhaps the 21st century's revival of Alfred Whitehead's assertion that the 19th century's most significant invention was the method of invention itself. However, another side of this debate asserts that higher education must extend beyond a utilitarian and pragmatic scope to include existential dimensions and in particular, to emphasize the juxtaposition of agency with wellbeing, happiness and global citizenship.

> [T]he cultivation of lifelong learning abilities in higher education needs to be conceptualised and sustained through a focus on the constitution and operation of agency. The cultivation of lifelong learning as a set of agent abilities needs to be grounded within the

> mode of *being*, a concept inspired by Heidegger, rather than within *having* or *doing*. [italics in original] (Su, 2011, pg. 399)

In other words, higher education must prepare students to engage with the world through a deep and mindful connection, around them rather than by merely accumulating data or superficial action. Su also argues for the role of emotion, for "Honouring the role of feeling in agency" (pg. 409). Fallon and Goodman (2015) point out that wellbeing and happiness are increasingly common areas of research in higher education and not surprisingly, these concepts are related to both agency and social dimensions (Fallon & Goodman, 2015; McIntyre, 2006; Siddiquee, Sixsmith & Haworth, 2016). Advocates of this argument recognized that higher education needs to be revisited and revised. Traditionally disparate and disconnected disciplines are not congruent with the expanded goals of contemporary higher education. As the Director-General of UNESCO argued in 1999, "We must rethink our way of organizing knowledge. This means breaking down traditional barriers between disciplines and conceiving new ways to reconnect that which has been torn apart. We have to redesign our educational policies and programs (Morin, 1999, Preface, n.p.)

This paper chronicles the development and of a curricular module entitled Wellbeing and Happiness for Self and Society. This course was designed to accept students in the role of curricular leaders who will guide much of the learning experience. One way this is to be accomplished is through transcending both disciplinary and institutional boundaries by including students and faculty from a minimum of three universities but hopefully more, and multiple disciplines. This module is organized around a sequence of three objectives: (1) To develop through a critical and reflective process a student's conception of wellbeing, understanding of an intersectional array of its determinants, and a clarity regarding the associated values within the contexts of daily living and the arc of his/her life; (2) To synthesize the values, interests, and skills of students of multiple disciplines into a collaborative project to innovate a wellbeing initiative; and, (3) To apply a design thinking oriented collaborative process as an interdisciplinary team to innovate the philosophical, technical, and social goals, objectives, and initial prototypes of a wellbeing initiative to be of pursued as a "spin-off" following the course. These initiatives could be a community project, product or service concept, approach to self-care, conference proposal, research project carried out

as a future course of study, or other proposed strategy of achieving an innovative agency of facilitating wellbeing.

By providing a qualitative narrative and assessment of the module's objectives, syllabus, and pedagogic methodology this paper aims to illustrate how and to what extent might a university course foster innovation as a form of agency by deepening the intentions of students through an orientation to wellbeing and broadening their capability through interdisciplinary design collaboration. This review of the module's design is organized to generate a functional rubric with which to guide and evaluate the iterations of this module and other similar curricular initiatives.

2. Background

Qatar is a small peninsula of approximately 11,500 square kilometers that borders Saudi Arabia and extends into the Arabian Gulf. The capital city is Doha, which is where most of the nation's 2.3 million inhabitants live. Qatari nationals comprise approximately 12 % of the population, the remainder come from 62 other nationalities (DSouza, 2017). Qatar is one of six members of the Gulf Cooperation Council (GCC) and has been a sovereign state since 1971.

2.1 Inspiration for the Course

The Qatar Foundation for Education, Research and Science, and Community Development was established in 1995. One of the main achievements of The Qatar Foundation has been the creation of a multiversity campus in Doha, Qatar consisting of nine universities, including six US university branches. In the Spring of 2017, Qatar Foundation's Vice Chairperson and CEO, Her Excellency Sheikha Hind bint Hamad Al-Thani, in pursuit of having innovative approaches in higher education developed in Qatar visited the Virginia Commonwealth University's (VCU) Da Vinci Center; an Innovation and entrepreneurship hub for academic collaboration among VCU's Schools of the Arts, Business, Engineering and College of Humanities and Sciences. Soon after this visit HE Sheikha Hind commissioned the Deans of Texas A&M University in Qatar, VCUarts Qatar, and Weill Cornell Medicine-Qatar to collaborate in developing an interdisciplinary course related to health and happiness within society.

3. Course Development

Based on expressed interest, a team of six faculty members at these three universities a team began a collaborative process to designing a course. This group included professors specializing in digital imaging, biomedical engineering, physics, educational leadership, sociology, and design. These faculty members would also comprise the teaching team for the course, although guest presenters were planned from the very beginning. Given the health orientation of the course's commission and the six faculty members being based in engineering, medical, and design schools, the course focused upon the idea of wellness. However, by the end of the group's first session the members were able to center the scope of this course on the notion of wellbeing for both the individual and society and to expand the scope of wellbeing as a concept that transcends physicality to include dimensions including spirituality, existential meaning, cognition, emotion, and so on. The development team added the concept of happiness to the course title as a reflection of this expanded focus.

Conceptualizing design, through the methodology of design thinking, as being more of an attitude and approach to engaging with diverse and dynamic situations as opposed to it being understood as a disciplinary practice was pivotal in enabling coalescence of the multiplicity of disciplinary norms, values, ideas and methodologies. Design was presented as more of an "extra-disciplinary" matrix or platform to facilitate a generative process of creatively aggregating the knowledge-set from the participating disciplines in a way that is appropriately responsive to the context being acted towards.

Another influential notion that organically crystallized within the development team was the sense that this course was charting new territory in higher education and particularly so within the GCC region. This sense perhaps was prompted by the nexus of the three conditions of the stipulated multiversity context: an expectation of interdisciplinary engagement amongst faculty and students within QF, anticipated transdisciplinary content and recognizable relevance of the course, itself. This sense of groundbreaking enabled the team to effectively resist various propositions of traditional frameworks of content and conventional modes of teaching and learning that arose throughout the development process. It also encouraged team members to continually and reflectively consider their individual experiences, observations, and values as a resource in comprehending and transposing the expansive scope of wellbeing. This enabled the team to feel comfortable and even inspired by "wild" ideas such as

when it was suggested that the course hold its class sessions on a bus that could be driven to various areas within Qatar and thereby situate the students and faculty within specific environments in congruence with the objectives of each class session. In this way, rather than discussing the situation of migrant living arrangement, the students and faculty could drive out and see the living arrangements firsthand, speak with migrant workers and in so doing gain a deeper and more personalised learning experience.

In retrospect, it is possible to see that this emphatically collaborative orientation led the team of faculty toward seeking sufficient physical space to enable facilitation of processes of both individual reflection and small group collaboration amongst students. The course design also deliberately avoided a prescriptive sequence of content to guide the learning so as to enable a stronger degree of student ownership of the learning foci and methodologies. The course design team approached the course development process as a project to be realized rather than a task to be completed and the creative agency that emerged within the team's work was inculcated into the design of the course.

3.1 Course Objectives

The collaborative Wellbeing and Happiness course is organized around three objectives: (1) to develop through a critical and reflective process a student's conception of wellbeing, understanding of an intersectional array of its determinants, and a clarity regarding the associated values within the contexts of daily living and the arc of his/her life; (2) to synthesize the values, interests, and skills of students of multiple disciplines into a collaborative project to innovate a wellbeing initiative; and, (3) to apply a design thinking oriented collaborative process as an interdisciplinary team to innovate the philosophical, technical, and social goals, objectives, and initial prototypes of a wellbeing initiative to be of pursued as a "spin-off" following the course.

3.2 Course Design

The most persistently expressed aspirations among the course design team was a desire to: (1) engage students with an understanding of the condition of their own individual being in terms of what they value and the implied forms living well/not well and being contented/discontented; and, (2) have the student's consider how they might orient their develop-

ing capabilities toward making an impact in society. These two driving ambitions created a scope of the course (figure 1) that centered around the notion of agency for each student. Agency is conceived of as arising from a holistic synthesis of the student's individual personhood that ultimately determines the intention brought to bare within his/her application of capability or competency. Thus, the notion of a process of cultivating agency for being well that emerges between the self and society became the fundamental goal of this course.

Built around this core of agency for being well was a scope determined by the two spectrums of wellness – unwellness and daily living – life cycle (birth to death). This scope is definitive yet open enough to accommodate consideration and inquiry from individual, sociocultural, and disciplinary perspectives. The dynamics intended within this scope are for the individual viewpoints to be informed by sociocultural and disciplinary perspectives in a manner that enables each student to proceed through a process expanding his/her inquiry from the frame of themselves to the broader context of society (in this case, Qatar). This scope of this process is anticipated to involve the three dimensions of: (1) the individual (personal) to the collaborative (multidisciplinary); (2) the micro to the marco levels of individual and collective living; and (3) the thematically and topically organized considerations of wellbeing.

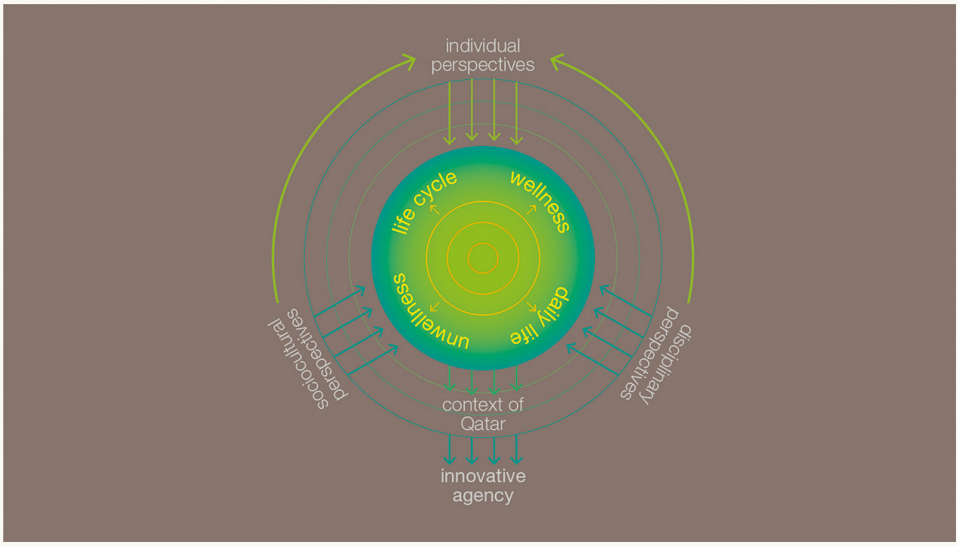


Figure 1. The scope of the course supports the individual, multidisciplinary, multi-level, thematic, and topical considerations of wellbeing.

Because the course uses a broad and multidimensional scope of inquiry to investigate the dialectical relationship between self and society with a particular focus on and the nature, process and impact of agency development, an effective and flexible method of organizing course content was needed (figure 2). Throughout the course design process the team's individual reflective and disciplinary conversations revealed a sustained interplay between the more fundamental or philosophical questions and the more pragmatic aspects of life and living. It became evident that the inquiry of this course centered on the bridging of human *being* and human *doing*. This core of consideration was then organized by creating a set of primary thematic categories that could each be examined through the lenses of relevant issues. The two intersecting spectrums of environment/behavior and individual/collective were used as primary thematic categories. The development team also decided on the themes of expectations (associated with environment), autonomy (associated with behavior), beliefs (associated with individual), and connection (associated with collective). These themes created the topic spaces that could then be adopted by the students for individual and collaborative projects. Themes were sufficiently open to allow for a broad scope of inquiry. For example, the theme of expectations could involve topics relevant to environmental impacts on wellbeing such as the processes and conditions of places, externalized demands, and material substances. As a complement to this, the theme of autonomy could be supported by topics relevant to practices of self-care and harm, and the nature and process of individual lifestyle. The theme of beliefs would support topical consideration related to emotional wellbeing including aspects of and processes of individual resilience and coping. The fourth theme, connection, offers investigation of transformative leadership and its capacity for improving conditions of society, as well as other related topics.

Overall, this method of organizing course content using themes and topics surrounding the connection of human *being* and *doing* is intended to be a viable mechanism for integrating the anticipated sets of varying individual, sociocultural, and disciplinary knowledge within the students and their collaborative teams. In particular, this process is designed to enable reflective, flexible and broad-spectrum inquiry in conjunction with the faculty although students will be the main driving force of these inquiries.

The structure of the class (figure 3) consists of three phases organized in a linear manner to facilitate the students progressing through a process

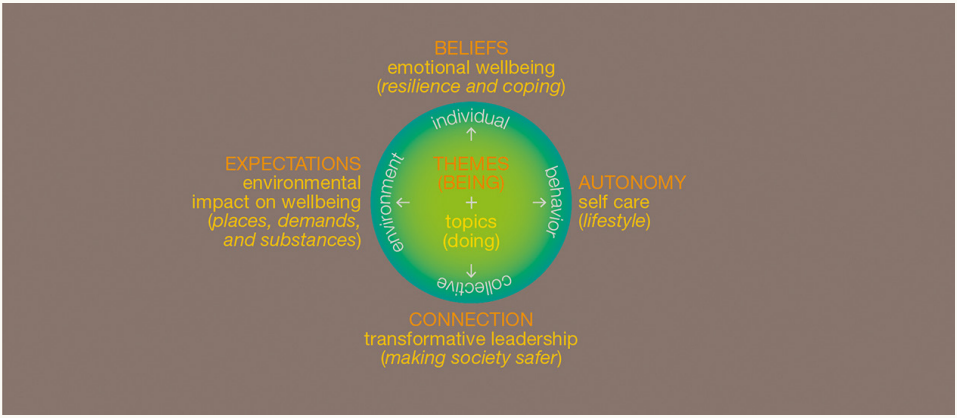


Figure 2. The method of a thematic generation and organization enables a connecting of being and doing, integration of multiple perspectives of consideration, as well as a flexibility to accommodate variability among student and team interests.

expanding his/her inquiry from the frame of themselves to the broader context of society (in this case, Qatar). The phases are sequenced to mirror this process of inquiry so as to progress from the individualized and self to the collaborative and societal. The first phase is a period dedicated to cultivating each students' self-awareness of his/her wellbeing in terms of individual values and their associated practices and conditions. The second phase has been established to provide a space for the students individually and collectively to interpret their own understandings of wellbeing within the context of Qatar. This interpretation aims to identify various potentials for enhancing wellbeing and happiness within their society. This interpretation process will conclude with the emergent coalescence of multidisciplinary concepts, ideologies and methodologies around project ideas. This process will be organic and will facilitate something of an "inspiration/ideation" design thinking approach led by the faculty. This organizing force here are expected to be a mixture of student interests, disciplinary relevance, and observed situations within the context of Qatar. The third and final phase of the course is a collaborative multidisciplinary team platform focused on innovating concepts and strategies of action toward social wellbeing. Small teams of four to five students from multiple institutions and disciplines will be guided by faculty through processes of facilitation and consultation in the areas of design thinking based innovation, interdisciplinary collaboration, and contextual research methods and processes.

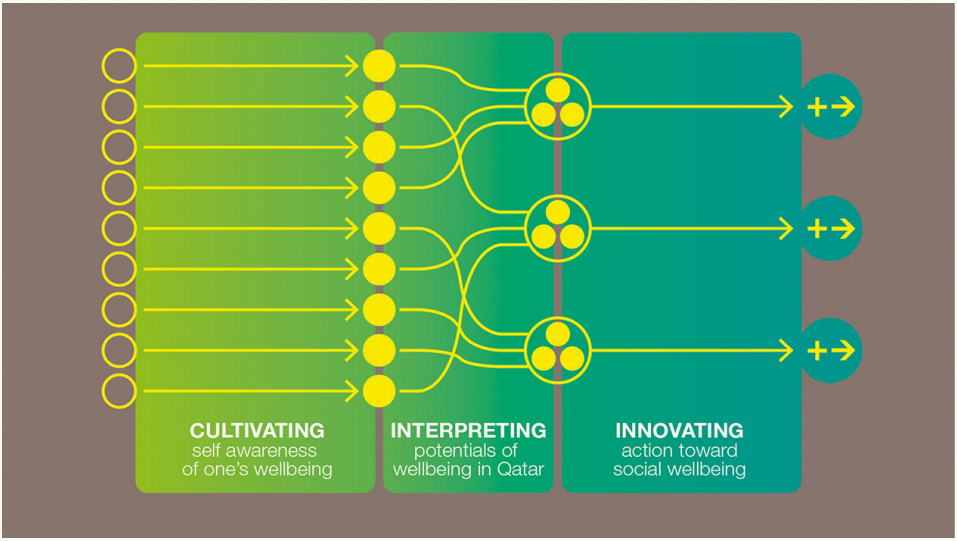


Figure 3. The course is linearly structured with three phases to facilitate a process on establishing individual awareness that can orient their intentions towards a contextually relevant collaborative innovation to generate a conceptually and strategically developed agency of wellbeing for self and society.

A framework (figure 4) has been designed to facilitate the three phases of the course process. The first phase of developing each student's awareness and understanding wellbeing organizes the four themes as parallel concurrent process of inquiry with the expectation that the faculty will facilitate a dynamic interaction among these four lines of reflection and investigation. Throughout this phase of five to six weeks the students will be encouraged to reference their own experiences and values with events, systems, conditions, and entities that are occurring in their context. This initial phase will culminate into students creating a (self)portrait of wellbeing that will articulate, through a number of modes, their understanding of what are prominent constituents, circumstances, and dynamics involved in their wellbeing and contentment within their being and doing.

The second phase, as described earlier, is a more organic space for an emergence of clusters of student interests and ideas that form into small interdisciplinary teams with a project proposal. The course faculty will facilitate responsively a process of identifying/expressing interests and ideas among the students and the interfacing needed to prompt cluster formation. Also, within this phase the faculty will support the identifica-

tion and interfacing with potential external stakeholders to either become consultants or participants in the student team projects. This two week phase will conclude with each newly formed team to present to the class and any engaged stakeholders a project proposal that establishes the team's general and specific aspirations for changes of conditions in society, points of departure, and ideas of the scope, goals, and approaches to the interdisciplinary innovation process it is about to embark on.

After receiving critical feedback from this presentation, the teams will proceed into the final phase of the course where they continue their interdisciplinary collaboration. The course development faculty decided that because this collaboration is a relatively open-ended innovation initiative that a process facilitated by a design thinking methodology will be most effective for this phase. Design thinking's capacity for a responsive and non-linear process will enable each team to determine its own development and integration of its insights, values, goals, ideas, and strategies. Through a responsive facilitation of this design thinking process by the faculty each team will be able to find an effective application of design thinking's inherent aspects of empathy, integrative thought, optimism, experimentalism, and collaboration outlined in Brown's seminal overview of this innovation methodology (Brown, 2008). Throughout this process, the teams will be mentored in their research of context and engagement of any potential stakeholder. Also, each team will be mentored by the faculty in their methods and process of collaborating across multiple disciplines.

The objective of this final phase, as supported in the course framework, is for each team to develop a proposal of future action that clearly and strategically outlines a course of action that will facilitate the promotion of wellbeing within some area of society. The course development team has used the concept of a spin-off to describe this deliverable of the course. In essence, each team designs a spin-off from the course by developing a concept and strategy of impactful action that can be pursued following the completion of the course. Possible examples of this spin-off deliverable include, but are not limited to, students engaging in a community project, proposals for a product or service concept or an approach to self-care, proposals for a conference, research proposals or proposals for a future course of study related to the wellbeing promotion objectives and ideas within a team's project goals. Regardless of the specific nature and process of the deliverable, it must contain some form of innovative attempt at agency in facilitating individual and social wellbeing.

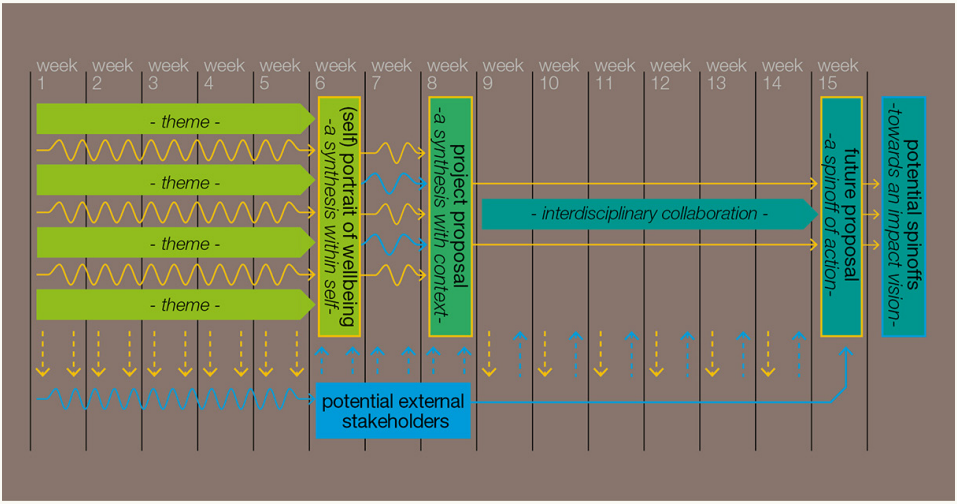


Figure 4. The course framework is generally organized by the three phase process of the course. Each of these phases involves interactive dynamics among the various elements to facilitate the responsive, emergent, collaborative and contextual engagement and impact orientation of course objectives.

The fundamental concern of this course is to cultivate within the students a greater agency for wellbeing for self and society. The course design was conceived and organized around this core of agency by focusing on scope, a system of themes and topics, a process, and a framework. The intention driving the course design is to facilitate students' development of innovative proposals for actualization, thereby creating a sense of agency within them that is not confined to the pragmatic scopes of their respective disciplines, In other words, the course is designed to enable student agency to extend beyond utilitarian objectives to include more fundamental and existential dimensions related to themselves and their society living well.

This concern and intention has led to the embedding of a pedagogical approach within the course process and framework that strategically arranges multiple pedagogical approaches including reflective inquiry, critical analysis, cumulative, blended, and experiential learning to develop a foundation of self awareness and insight for the collaborative project-based learning (PBL). In turn, the PBL is driven by a design thinking process that enables sufficient flexibility to allow for a wide variety of course learning and outcomes that are more self-determined by the students rather than by disciplinary curricula.

Critical to student self-determination is the use of a design thinking process to facilitate interdisciplinary and collaborative project-based innovation. This is because despite the many models and methods of design thinking, it is always oriented on a structure that is basic to praxis, the fundamental condition of agency. Brown identified this structure as a circular arrangement of three spaces; inspiration, ideation, and implementation. This structure persists despite design's reflexive consideration and establishes a uniqueness of practices that have been coalesced into the notion of "design thinking" which, by its very nature, involves multiple perspectives (Kimbell, 2011). This is so because design thinking is organized with a generalized model of "three stages: Discover, Create, and Build (Cupps, 2014)."

The paradoxical nature of design thinking, to be a unique situational practice while simultaneously organized around a fundamental process of integrating the "why, what, and how" across a full arc of doing, is perhaps what makes this mode of thinking an attractive approach for engaging students within a praxis that is characterised by self-determination and a self-awareness of wellbeing. It is this underlying objective that was the inspiration for designing the course as a platform for students to cultivate an agency for wellbeing through facilitating their own integration of the "why, what, how" of acting toward their individual, and society's collective, wellbeing.

4. Rubric for Evaluation of the Course Design

As has been stated above, one of the overriding foci of this course is to examine how and to what extent a university course might foster innovation as a form of agency by deepening the intentions of students through an orientation to wellbeing and broadening their capability through interdisciplinary design collaboration. In reviewing the genesis of this course and chronicling the course's development, we have attempted to present the course design as organized to generate a functional rubric (table 1) within which to qualitatively guide and evaluate the iterations of this module and other similar curricular initiatives. We now present our formulation of this rubric.

Operative Aspects	Ranges/States (as course design is able to facilitate/support)
1. Impact on student self-awareness and understanding in terms of the dynamics and practices of being well/unwell	a. Holistic scope b. Integrated and systematic perspective c. Balance of personal and formal knowledge d. Incorporation of criticality and compassion
2. Degree students synthesize, among peers (multiple disciplines), their values, interests, and skills into a collaborative project basis to innovate a wellbeing initiative	a. Relevance and coherence of defined context, scope, and value of project b. Apparent viability and feasibility of project according to team's skills and resources
3. Quality of student team organization of research of context (stakeholders and conditions) according to their interests and incorporation of resulting insights into their project goals and strategies	a. Research design and execution b. Impact on innovation process
4. Degree of intention for impact through innovation	a. Identified relationship between outcome of team collaboration and individual values b. Presence and clarity of general and specific aspirations for changes of considered conditions in society
5. Quality of collaboration throughout a generative process organized by a design thinking methodology	a. Transcendence of coordinated linear multidisciplinary production toward a transdisciplinary innovation b. Coordination and use of team member strengths c. Degree of shared process leadership, trust, and ownership d. Equitable distribution of participation and investment
6. Degree of student (individual and team) determination and development of thematic and topical inquiry	a. Student decision-making achieved b. Distribution and interrelationship between identified personal and disciplinary (curricular) relevancies

Table 1. Rubric for evaluating course iterations.

5. Course Implementation

At the time of this writing the inaugural offering of Wellbeing and Happiness for Self and Society has just begun. Our initial goal was five students from each of at least three or four universities in Qatar Foundation, thereby enabling students to form into small groups comprised of one student from each university. Owing to the uni-curricular focus of Qatar Foundation universities (Texas A & M teaches engineering, Weill Cornell teaches medicine, and so forth), this would allow for multiple institutions and multiple disciplines represented within each small group, which would therefore also allow for a multiplicity of institutional cultures and ideologies represented within each group.It is exactly this diversity of thought and experience that the course developers wanted in the course and the course was advertised across all of Qatar Foundation with the hope this diversity of students could be achieved for the January beginning of the course. Such did not happen. Due to a variety of factors, we ended up with students from multiple disciplines but from only one university. The development team was fully aware that the first run through of the course would be a period of high learning for both faculty and students so we decided to carry on with the course albeit with a modified methodology because there are only enough students for one small group. As such, the faculty plan to focus more upon forming students pairs and triads throughout the semester, in addition the one small group of students registered for the course.

6. Future Research

The unique nature of the course development process, the innovative features of the course itself, and the reality of the implementation of this course each suggest a variety of areas ripe for future research including, but not limited to, the following. First, future research might examine the disciplinary composition of the development team and investigate the possible impact of faculty from other disciplines. Ethnicity, gender, age, and other demographic factors might also be investigated for possible influence upon the nature and process of the development experience. A third area of investigation can be found in examination of the nature and degree of influence of these factors in relation with the students registered in the course. Fourth, research might also examine the contraining and beneficial factors leading to student registration in such a course in this unique socio-geographic location as well as in other locations in the

world for comparative analyses. In addition, pre and post analyses of student engagement and learning within the course may shed light on important outcomes and experiences within the course. Similarly, pre and post analyses of faculty goals, expectations and experiences might prove enlightening for faculty attempting similar courses in the future. Longitudinal research of multiple semesters of the course would provide yet another area of future research.

Peter Martin
Interim Chair, Graphic Design,
Virginia Commonwealth University
School of the Arts in Qatar
psmartin@vcu.edu

Byrad Yyelland
Interim director, Liberal Arts & Sciences,
Virginia Commonwealth University
School of the Arts in Qatar
psmartin@vcu.edu

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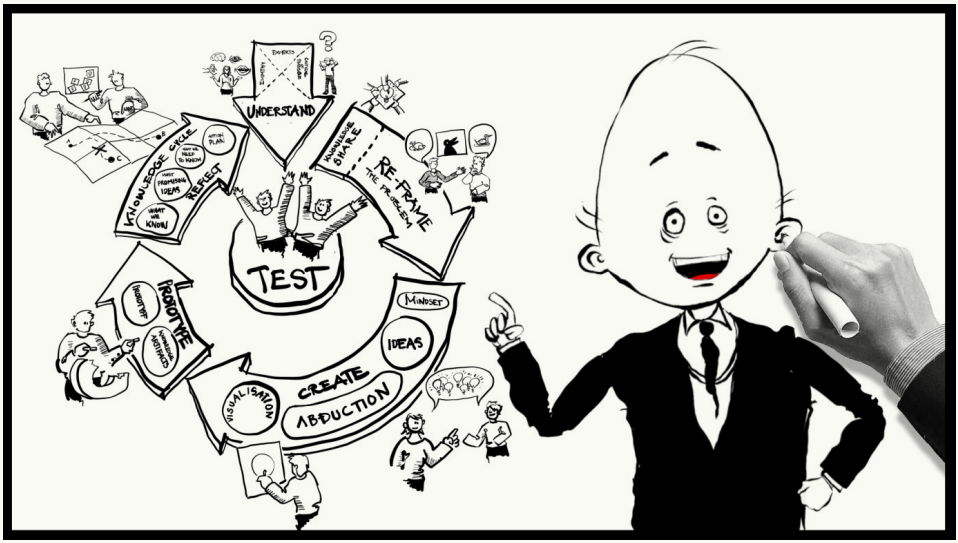
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Building on Design Thinking

Video presentation

Paul J. McElheron



Screen shot from the animation film: Building on Design-thinking

Duration: 7 minutes
Theme: Innovation
Keywords: design, knowledge, creativity, innovation, interdisciplinary

Creativity, innovation and the process of generating and applying new knowledge are inextricably linked. Design thinking has been shown to generate creative solutions to difficult problems and provide incremental innovation across a wide range of sectors. However, most problems require creativity *and* knowledge to solve them. Our studies on interdisciplinary teams of students using a design thinking methodology and working with these types of problems reveal that the most effective teams, in terms of innovative high knowledge concept generation, employ an effective knowledge acquisition, sharing and idea building strategy and this approach draws on several principles of knowledge building. The new knowledge, generated collaboratively allows analogical thinking leading teams to explore new technologies and meanings. These teams are effectively working creatively *with knowledge* and this increases the innovative content of their output.

We have combined the process and practices of design thinking with the practices of knowledge building to produce a unified model. The film *Building on Design Thinking* presents our approach to integrating knowledge building principles into a design thinking process as an approach to

foster innovation capability. Design thinking is represented by a clear process and procedure and knowledge building by a set of principles proposed as pedagogical scaffolds. Although design thinking and knowledge building have separate developmental histories, there are reasons to suggest that there is a relationship between the two. They both address ill-defined "real-world" problems and focus on working creatively with ideas to synthesize solutions. There are differences though; the focus of design thinking is on a "better" solution, sometimes represented as a product or artifact. Knowledge building focuses more on collective knowledge advancement as a learning outcome.

The film explains the two approaches to innovation, and communicates the rational for combining them in a unified model. We also provide empirical evidence for the models utility as a stimulator of interdisciplinary collaborative practice and innovation and we include several "real world" examples. This diversified approach adds an extra dimension to innovative problem solving providing an alternative to the "lockstep" approach often applied in these situations and we offer some quantitative data to support this. We have found that combining design thinking processes and practices, with knowledge building principles help students receive and understand the innovation process at a deeper level, remain in design-mode and results in greater creativity and innovation capability.

We have found that a mixture of narrative and engaging visuals results in a richer and more durable memory representation and allows the viewer to make associations & connections and aids the understanding of new concepts.

Paul J. McElheron
Assistant professor,
VIA Design, Centre for Research and Development, Herning, Denmark
pme@via.dk

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Solving Titanic Problems The contribution of design-thinking and knowledge building.

Paul J. McElheron

Abstract

This paper explores the contribution that the principles of knowledge building can bring to the process and practices of design thinking in terms of developing more innovative concepts. Also how these processes, practices and principles can be effectively communicated to novice designers. The rational for combining design-thinking and knowledge building is explained and an integrated model proposed. Design thinking and knowledge building are two rather ambiguous concepts and in order to help communicate them to students a "wicked" problem was required. We chose a titanic one, specifically the sinking of RMS Titanic in 1912 after striking an iceberg. Only 705 passengers and crew survived out of the 2,227 on board. Student teams are "placed" on the deck of the Titanic one minute after the collision and given the problem: "How would you save more passengers and crew?" Half the teams use a design thinking methodology to generate solutions, the other half use the integrated design-thinking/knowledge building model. Teams using design-thinking generated solutions that save over 900 additional lives. Teams using the combined approach generated solutions which could, potentially save the entire ship. For problems that require both creativity and knowledge to solve them, the integrated approach leads to more innovative solutions. Observations made during the design session and interviews with participants allow us to make some suggestions explaining the differences.

Theme: Innovation
Keywords: design-thinking, innovation, creativity, collaborative knowledge creation

1. Introduction

We have been using a design-thinking methodology to assist multidisciplinary student teams unlock their creative potential and generate innovative solutions to indefinite, ambiguous design problems, (so-called "wicked" problems, Rittel & Webber, 1973:159). Our studies suggest that this approach does improve student teams´ innovative capacity as measured by the innovative content of the concepts they develop. However, complex problems require both creativity and knowledge to solve them, (Dörner & Funke, 2017). Observations made on the most highly effective

teams working on these types of problems reveals they use an effective knowledge acquisition and sharing strategy within a design-thinking framework and use this knowledge to collectively improve ideas to create radically innovative solutions. The methods they use are associated with the principles of knowledge building.

We have modelled this behavior and combined the process and practices of design-thinking with the principles of knowledge building to develop a unified innovation model. This model has been evaluated using over 500 students and the conclusion is that it does help students frame problems at a higher level and generate more innovative solutions relative to students using design-thinking alone. However, our experience is that design-thinking and knowledge building present some interesting pedagogical challenges, specifically how two ambiguous concepts can be communicated to students meeting them for the first time and how the value knowledge building brings to design-thinking can be demonstrated in a meaningful way. Understanding does emerge over time but we were looking for ways to expedite the process.

Wicked problems are synonymous with design-thinking but we chose a titanic one, specifically the sinking of RMS Titanic after striking an iceberg in 1912. Many passengers and crew perished in the disaster and students were asked to generate solutions that might save more people on-board. We anticipated this challenge would engage students, enable them to use the process & practices of design-thinking with the principles of knowledge building and allow them the opportunity to generate both incremental and possibly radical solutions.

The inspiration for this challenge was the documentary: "Titanic – the final word with James Cameron", (National Geographic, 2012). Cameron directed the film Titanic in 1997 and in the documentary he leads a forensic investigation by a team of experts to determine how the Titanic sank. Towards the end of the documentary, Cameron poses the question: "With what we know now, is there anything that could have been done to save more passengers once the Titanic struck the iceberg?"

1.1 Communicating Design Thinking and Knowledge Building

Design-thinking is a creative problem solving process that starts with understanding user needs, framing problems to establish real needs, generating ideas then prototyping and testing the most promising solutions.

It has however attracted a level of criticism over the years and some of this criticism has implications for teaching design thinking and its potential as a driver of innovation. A widely acknowledged issue in the design thinking discourse is the difficulty explaining what design thinking is, there is no generally agreed definition for design-thinking and the "literature on which it is based is contradictory", (Kimbell, 2009:1). Both a shared understanding and a detailed description of design-thinking are required to communicate the possibilities and value of design-thinking, (Hassi & Laakso, 2011:2). Rylander (in Kimbell 2011:228) suggests that it is "hard enough understanding design and thinking, let alone design-thinking".

Knowledge Building also has some challenges when it comes to communicating the concept to students. Like design-thinking it is a rather ambiguous term but contrary to design-thinking, it has an agreed definition as a social activity focused on the continuous generation of ideas, (Scardamalia & Bereiter, 2006). It is based on a set of principles aimed at maintaining creative, sustained idea improvement rather than a "process", practices or a prescribed methodology. In our experience, novice designers who lack domain experience or procedural knowledge benefit considerably from a process. Scardamalia & Bereiter, (2006) acknowledge that adhering to a principled rather than a procedural approach has undoubtedly impeded the spread of knowledge building.

A second issue is the type of innovation that can be expected from the human-centered design-thinking approach and the role of empathy as a starting point for radical innovation. Human-centered design has been criticised for lacking the skills & knowledge that are required to operate in a strategic innovation context. Norman and Verganti, (2011) conclude that, while human-centered methods are well suited to incremental improvements, (hill-climbing) they are unlikely to lead to radical innovation, (finding new hills to climb). This can usually only result from a change in meaning, (new interpretations of what is meaningful for people), and/or changes in technology. Van der Bijl-Brouder & Dorst, (2017) also agree that in order for human-centred design to contribute to strategic innovation, a deeper understanding of user needs is required rather than just stated needs or needs at a scenario or context level. Knowledge building has as its starting point a critique of the status-quo and use of expert sources of information as will be illustrated later.

2. Methodology

Twenty 6. semester BA Design & Management students volunteered to participate in this study which they were informed was an investigation into how design-thinking may be used to solve "wicked" problems. None of the students were aware of the knowledge building methodology embedded in the study. In terms of prior knowledge, several of the students had heard of design-thinking but none could articulate the process, though all were familiar with some of the associated practices such as empathy mapping, brainstorming and prototyping. None of the participants had heard of knowledge building as a concept. All had heard of the *Titanic* and had seen Cameron's 1997 epic romance-disaster film at some point.

Students were randomly placed in multidisciplinary teams of five and informed that the problem they would be solving involved the sinking of RMS Titanic which struck an iceberg and sank two hours and forty minutes later resulting in the death of over 1500 passengers and crew, only just over 700 survived. The challenge given to the students was; "How could more passengers and crew have been saved?" Teams were invited to generate solutions and estimate how many passengers these solutions might save. The teams were "placed on deck" one minute following the collision with the iceberg. Much has been written about what contributed to the disaster, the construction of the hull, the lack of lifeboats, the speed the ship was travelling etc. However these were not the team's concern as the ship had hit the iceberg. The teams were given a briefing which consisted mainly of a list of facts & figures known to the crew of the Titanic at the time. These included:

- It's quickly obvious to the Captain and chief officers that the ship will sink in under two hours, (it actually sank two hours 40 minutes following the collision).
- There are 2,227 passengers and crew on board.
- There are 20 lifeboats available, each with a maximum capacity of 65, approximately 53% of the passengers and crew.

Teams were provided with information about the scene of the collision. It was a clear moonless but starry night, the sea was flat calm and the water temperature estimated to be around zero degrees Celsius. A ship, the SS Californian has been sighted approximately 6 miles in the distance but is not responding to the Titanic's distress signals. The iceberg is less that

one mile away and its size above water is estimated to be between 50 and 75 meters high and 75 meters wide. The teams were instructed to construct a "mock-up" of the scene approximately to scale using materials made available.

As part of the briefing and in true design thinking fashion, the group was asked to construct an empathy map. Empathy mapping is often used at the beginning of the design thinking process to gain user insights. They work best when drawn from real data but this was of course not possible however students were asked to make one based on the facts presented so far, the results are summarized in table 1, column 2.

What are passengers?	Student imagined response	Probable response based on survivor accounts
Thinking	"We are going to die!"	"The Titanic is unsinkable"
Feeling	Fear, Panic!	Concerned, but feel safer staying with the ship
Saying	"We need to get into the lifeboats"	"The captain will save us". "We don't want to get into lifeboats".
Doing	Panicking. Trying to locate family, friends & valuables. Get to a lifeboat.	Initially very little.

Table 1. Results of the Empathy mapping exercise. Student imagined response and probable response based on the literature.

The students were then presented with an empathy map compiled by the author based on survivor accounts, (Lord, 1956; Jessop, 2012), of the events immediately following the collision, (table 1, column 3).

There are some striking differences. The evidence suggests that the passengers had great faith in the ship and its captain. The *Titanic* had a reputation of being unsinkable, (though the owners, the White Star Line never made this claim), and had several safety features.

All teams were then taken through the college's design-thinking model, The Strategic Design Practice (SDP) – 5F model, its process and associated practices, (tools).

To conclude the team briefing, the group was asked to suggest how the captain of the *Titanic*, Captain Smith might have framed the passen-

ger survival problem and after some discussion there was general agreement that the Captain's framed problem was "How can we save half the passengers?" The groups reasoning for this was the captain was informed by one of the chief designers, Thomas Andrews who, after inspecting the damage, stated that the ship was doomed and he knew there was only lifeboat capacity for half the passengers and crew.



The SDP 5F+K Model which comprises of a research phase, FIND. A problem framing phase, RE-FRAME. An idea generation phase, FORM. A prototyping phase, FABRICATE. A Knowledge Building cycle, (an addition to the basic SDP-5F Model) and a concept testing phase FULFILL. (McElheron. 2017).

The teams were then divided into two classrooms. Teams 1 and 2 made up the control group using the SDP-5F model to generate solutions. Teams 3 and 4 made up the test group and would be using the integrated design-thinking / knowledge building (SDP 5F+K) model, (see textbox), to generate solutions. Teams were not permitted to use the internet throughout the challenge. Each group had a facilitator instructed to provide assistance, answer any questions and keep teams on-track in terms of time but not to provide or evaluate solutions. A time clock showing ships time was projected onto a screen starting at 11:40 when the *Titanic* struck the iceberg and displaying information as it became available to the crew in real time. For example: 11:47: Engines stopped, 12:05: Order given to uncover lifeboats. 12:25: The rescue ship RMS *Carpathia* sails towards the *Titanic*, estimated time of arrival four hours, lifeboats begin to be loaded. 12:45: First lifeboat lowered away. 02:05: Last life boat leaves the ship. 02:20: *Titanic* sinks.

At the end of the challenge, teams were asked to present their ideas along with an estimation of how many people their concepts might have saved.

3. Observations and results

Firstly, the control teams 1 and 2. Both teams started with the revised empathy map and reasoned that people being reluctant to get into lifeboats might be due to a lack of information & might explain why only

32% of the passengers and crew survived out of a possible 53% (full lifeboat capacity as indicated in the brief). This prompted a question from team 1, "Why didn't 53% of passengers make it into the lifeboats and from team 2: "Were all lifeboats launched and how full were they".

These are obvious questions and the facilitator was prepared for them. Only 18 out of 20 lifeboats were launched. The consensus in the literature is that the captain's order "women and children first" was interpreted as "women & children only". As a consequence, several lifeboats were launched with plenty of room for more passengers, simply because there were no more women & children in the immediate vicinity, (Greely, n.d.). Also, only 5% of the *Titanic's* crew were experienced sailors, the remainder being engineers, stokers, stewards etc. Most of the crew had not worked together and a safety drill planned for earlier on the day of the collision was not carried out. Both teams saw the problem of under filled lifeboats as one to be addressed by having the loading supervised by the most experienced crew with clear instructions to ensure all lifeboats were filled to capacity. Team 2 suggested +10% of capacity as the sea was calm.



Figure 1. A team working on the Titanic challenge.

Both teams re-framed the problem question in a similar way, given that there is insufficient lifeboat capacity, as "How do we keep more passengers out of the water?" This led to both teams constructing floatation devices out of tables, doors, trunks etc. held together with rope and canvas. Team 1's solutions consisted of individual rafts for 5–8 persons. Team 3 got the idea of linking rafts together to form networks of rafts connected by planks and canvas. Team 1 had the idea of constructing survival suits made out of canvas. Team 2 suggested sending one lifeboat loaded with crew and signaling equipment towards the *Californian* 6 miles distant but which had not yet responded reasoning that if they got within hailing distance they could attract the ships attention and get it to sail towards the *Titanic* to pick up passengers.

Moving on to teams 3 and 4. These were informed that they would be using the modified SDP – 5F+K model, knowledge building principles and the additional knowledge building cycle. These concepts were explained to them. The modified approach starts with, in an addition to

user empathy, a critique of the status quo and use of expert sources, an important knowledge building principle. If one is trying to solve a problem, it helps to know what is already known about it. The facilitator had an additional role here, the one of "expert" with instructions to provide answers to any questions raised by the teams but only using information known by the *Titanic's* officers at the time and not to suggest solutions. While the facilitator was not an expert as such, he had studied the literature concerning the sinking of the *Titanic* extensively.



Figure 2. A photograph taken by a passenger on the Carpathia of the last lifeboat to be rescued. Courtesy: WikiMedia.

Both teams initially focused on the reasons behind the undermanned lifeboats and were given a similar answer to teams 1 & 2. A member from team 4 asked if there were any photographs available of the lifeboats and this was quickly picked up by team 3. There are, and the teams were shown a photograph of a lifeboat, (fig. 2) with only 26, (out of a possible 65), passengers on board. This request for photographs was interesting. We have run this *Titanic* challenge several times and requests for photographs only come from knowledge building teams. Team 3 asked, at what stage were passengers aware of the real danger they were in? The answer to this is complicated, the Captain did not want to create panic and there was a lot of noise on the boat decks due to steam being vented to prevent the boilers exploding so communication would be difficult. This started a discussion around why information was not given to the passengers at an earlier stage about the realities of the situation? What was the captain's role?

The teams were encouraged to further critique the status quo and this generated a range of questions: What is the captain doing to slow the sinking? How sure are we that the skip is sinking? Isn't it supposed to be unsinkable? If it is sinking, could anything be done to stop it or at least slow the process down? How big is the hole in the hull? Can holes be plugged in some way? Teams 3 and 4 asked the "expert" about the size of the hole and if plugging a hole is possible. The expert confirmed that there is a well-known technique at sea called "fothering" where a heavy sail is drawn under the ship and the pressure of the water drives the sail into the leak.

Another observation, by this stage teams 3 and 4 were working as one team, drawn together by the search for information. This is significant in that we have frequently observed team collaboration in teams engaged in knowledge building but it is unusual for design thinking teams to collaborate in this way.

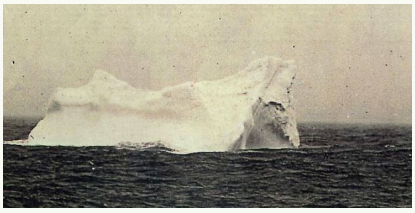


Figure 3. A photograph of the iceberg taken by the chief steward of the Prinz Adalbert. Courtesy WikiMedia.

A student asked if there were any photographs of the iceberg struck by the *Titanic*. It turns out there is, (see fig. 3). The comment from both teams was it looked a lot flatter than they had imagined. This prompted the teams to modify their icebergs to a flatter version resembling the photograph. Team 4 asked, "Would it be possible to put passengers on the iceberg?" The expert replied that people have survived shipwrecks by climbing onto ice floes. This had happened a few years previously in an area close to the *Titanic's* location and it's a reasonable assumption that some of the crew might have been aware of this. The facilitator invited the team to think of ways in which they could establish the feasibility of this idea.

The teams were encouraged to use the knowledge cycle section of the model to reflect on what they knew, what were their most promising ideas so far and what they needed to find out and how they get hold of the information. Team members were also encouraged to use a technique called scaffolding during this process. Scaffolds can be thought of as "bridges" used to build upon something students already know to arrive at something they do not know. Scaffolds are statements that help express and develop opinions and remain focused on using knowledge to develop ideas. The action plan for answering these questions was "ask the expert". The questions included how many experienced crew were available to supervise the life boats? What was available on board that floats?

The teams reframed the problem of "how to keep passengers out of the water *for three hours*. This reframe with the shorter time frame had the effect of adding feasibility, in the team's eyes, of several of their solutions such as making floatation devises, they would only have to keep people out of the water for a short-time. Attempting to plug the hole in the hull, it would only need to slow the inflow of water to delay sinking by a

couple of more hours. Also putting people on the ice, they would soon be collected. It also prompted one team member on reviewing the photograph in fig. 2 to comment, "Why are people wearing lifebelts? The sea is calm and the passengers will be picked up in a few hours. If you fall into the water the cold will kill you and the lifebelts could be used to build rafts".

The issue of the non-responsive *Californian* was raised. How had the *Titanic* tried to contact it? What methods were available to contact a ship at that distance?

Towards the end of the session the teams were encouraged to prototype their most promising ideas and estimate the number of passengers and crew their suggestions might save.

The teams estimates of additional lives saved is summarized in table 2:

Suggestion	Team 1	Team 2	Team 3	Team 4
Ensuring lifeboats are filled to capacity/over capacity	1,300	1,430	1,300	1,300
Construction of flotation devices	300	200	350	180
Making contact with the Californian	—	?	?	?
Construction of survival suits	15	—	—	—
Blocking the hole in the hull	—	—	All?	All?
Using lifebelts to construct additional rafts	—	—	100	—
Putting people onto the iceberg			240	240
Anchoring the ship to the iceberg	—	—	All?	All?
Number of passengers and crew saved	1,615	1,630	1,990/ All?	1,720/ All?
Percentage of passengers & crew saved (out of 2,227)	72.5%	73.2%	89.4%/ All?	77.2%/ All?

Table 2. Student team estimates of lives saved as a result of their suggestions, (shaded areas indicate teams working together).

3.1 Discussion

All teams managed to save significantly more passengers than the 705 that actually survived the sinking of the *Titanic*. However, the teams were working with hindsight and near perfect information. Their "passengers" were compliant model figures rather than real passengers in an increasing state of distress and panic and with crew having to cope with a dete-

riorating situation. Their solutions only had to be prototyped rather than implemented in real life.

In evaluating the team's suggestions we consulted the extensive literature available concerning suggestions for how more passengers on the *Titanic* could be saved. We refer to this as the *Titanic* community and it consists of numerous websites, journal articles, blogs, books, videos, documentaries etc.

All teams addressed the unfilled lifeboat issue highlighted in the brief. The team's solutions involved informing passengers and crew of the situation at an early stage, strong supervision of the loading process by experienced seamen to ensure all life boats were filled to capacity with an experienced member of the crew in each boat. In hindsight this is feasible, the ship had a 5 degree list but the lifeboats were being lowered into a flat calm sea and panic *can* be managed. Even the overloading suggestion by team 2 is feasible as there was ample freeboard for such an overload.

Constructing improvised rafts is a solution much discussed among the *Titanic* community and the consensus is that if it had been done it would probably have saved lives. There was certainly no shortage of materials on the *Titanic*. Teams 3 and 4 asked the expert what materials were available that would float and on the list were oil drums and 40 cars – (160 tires plus spares). These materials secured with planks, ropes and tarpaulin would in theory make stable rafts. Were team's overly optimistic in their estimates? Very possibly, it would take great organizational skills in difficult circumstances, however it is plausible. James Cameron's expert team thought that about 50 people could have been saved by improvised rafts. The survival suit idea is not one we have seen suggested so it's difficult to establish feasibility.

Using passenger lifebelts to create more rafts, (team 3), is interesting, it would mean persuading people to give up their lifebelts and it would go against standard maritime practice but over 2,000 lifebelts would make a lot of rafts.

Attracting the attention of the *Californian* and would it have helped is also something that has been the subject of much speculation. The teams proposed different solutions, (team 2 sending a lifeboat, teams 3 & 4 the increased use of rockets, (only eight were used during the actual sinking), and sending a message using the ships horn). Opinion is divided between those that believe the Californian was stranded in an ice field with engines stopped and would not have got there in time to make much

difference and those that believe it may, given its close proximity, have arrived on the scene to save some passengers.

Plugging the hole in the hull is another suggestion that has been the subject of much discussion amongst the *Titanic* community. As far as we know, the *Titanic* did not carry sails but it did have canvas hatch covers which may have sufficed. Many experts, (Greely n.d.), agree that fothering, (or similar damage control techniques), had they been attempted, were a viable solution to delay sinking.

Placing people on the iceberg was arguably the most controversial suggestion. It's a much debated topic and opinion is divided about the practicalities. There have been many documented cases of passengers surviving ship wrecks by climbing onto ice. The team's suggestion to discover if this was possible was to send a lifeboat with crew equipped with lights, ropes, ladders, spikes etc. to assess the situation. The teams reasoned it might be an option for younger able-bodies passengers and they would not have to be on the ice for long. So depending on the results of the reconnaissance mission it might have been an option. Teams 3 & 4 calculated with two lifeboats working in tandem making two trips – 240 passengers and crew in all.

Concerning anchoring the *Titanic* to the iceberg, the balance of opinion is that it would be a bad idea despite the iceberg having being estimated to having ten times the buoyancy of the *Titanic*. Icebergs can be unstable and approaching the iceberg would probably result in even more damage to the ship.

All teams were interviewed post-challenge. The design-thinking teams 1 & 2 felt that the process, practices and mindset was helpful in solving this challenge. They found that framing the problem "keeping people out of the water" helped focus on developing floatation devises and prototyping helped test ideas. They reported they had acquired a good overview of the design-thinking process and the practices to the point that they would feel confident to applying it in future projects. The facilitator reported that after dealing with the lifeboat under-capacity issue both teams fixed on the floatation device idea early and spent most of the remaining time fine tuning this idea.

The design-thinking /knowledge building teams generated more ideas, one of which could have saved all passengers, (fothering) and one which *may* have saved a significant number, (putting people on the iceberg). These teams asked more questions and used knowledge to re-frame the problem and generate more innovative solutions at a higher level. In

interviews the teams found critiquing the status quo was a useful path to generating new ideas and they valued highly the "consult the expert" option which helped them validate or reject trains of thought. The principles of knowledge building were easy to understand, but the concept of scaffolding was harder to grasp but they got it eventually. (Based on this feedback an additional scaffolding tool has been developed which links possible scaffolds to the various sections of the SDP 5F+K model). The knowledge building cycle, a main addition to the design-thinking model, helped them reflect on what they knew and what they needed to know which drove them to seek more knowledge. Asked if they could apply the combined approach in future projects they thought they could *with expert facilitation.*

Knowledge Building principles reinforced in this study

- Real ideas, authentic problems.
- Improvable ideas: ideas are considered improvable rather than accepted or rejected.
- Constructive use of expert sources of knowledge.
- Knowledge building discourse: ever deepening questions, clarity, better examples.
- Rise above: higher level of formulation of problems – there's got to be a better way.
- Epistemic agency: learners take responsibility for advancing knowledge.
- Idea diversity & symmetric knowledge advancement: to give knowledge is to get knowledge.
- (Scardamalia & Bereiter, 2006).

Concerning facilitation, the design thinking teams focused initially on addressing the unfilled life boat issue then moved onto prototyping raft solutions and stuck with this, refining their ideas until the conclusion of the challenge. The facilitator reported she had little to do, the teams "got on with it". She observed that both teams exhibited aspects of design fixation, latching onto an idea and sticking with it. The facilitator of the design-thinking/knowledge building teams had a different experience. The unified model promotes critical thinking and enquiry so he faced a lot of questions from students. Also several of the knowledge building principles, scaffolding, maintaining a knowledge-building discourse, and sustaining idea improvement required explanation and reinforcement. He observed that using knowledge building principles help keep student in *design mode*, (Bereiter & Scardamalia, 2003), focusing on the improvability and developmental potential of ideas throughout the challenge. This demand on facilitators has implications for future studies in terms of their level of expertise and familiarity with leading knowledge building workshops.

4. Conclusions and further research

The aim of this study was to communicate the concepts of design-thinking & knowledge building, and why it makes sense to combine the two methodologies and illustrate what this means in terms of increased concept innovation.

Teams using a design-thinking methodology proposed solutions which if successful would, in theory, save over 900 additional passengers and crew by ensuring lifeboats were filled to capacity and by framing the problem as one of keeping people out of the water and constructing prototype floatation devises. Teams using the combined approach produced more ideas to develop solutions that may have saved on average over 1,100 more passengers and two ideas which potentially *may* have saved all passengers, (one feasible, the other less so). The did this by critiquing the status quo, making effective use of expert sources as a starting point to close gaps in their knowledge, reframing the problem at a deeper level and scaffold their knowledge to improve ideas.

Our conclusion is that teams using the combined approach work *creatively with knowledge*. The source of innovation lies not just within creativity and stated needs but also in how teams collaboratively improve ideas. The *Titanic* case is an engaging one that appears to help communicate the design-thinking/knowledge-building concepts, the value they bring to each other and contributes to the validation of the unified approach.

Paul J. McElheron
Assistant professor,
VIA Design, Centre for Research and Development,
Herning, Denmark
pme@via.dk

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Service design tools for stakeholder dialogue and youth empowerment in Africa

Satu Miettinen, Tang Tang, Silvia Remotti, Emanuela Delfino, Francesco Brutto, Julia Dammann, Sara Alonso

Abstract

The aim of this paper is to present a service model and methods that enable empowerment and action in the context of the San youth. Their stakeholders have an extremely important role in both providing services as well as lobbying for their cause to improve the situation in the local context. When the public service production does not have vast resources available the role of civil society and non-governmental organisations become more and more important in the service production as well as in the service delivery. Further, it is fundamental to develop means for local dialogue that enables communication between different stakeholders and the San youth. This paper focuses on service design and creative methodologies that can be utilized for creating wellbeing at the local level in South Africa and Namibia. Service design has become an important tool for creating insights and understanding over complex societal challenges and finding new solutions for underserved and marginalized communities. It is looking at service design as a platform to create both foresight and solution-oriented process to create dynamic capabilities through local dialogue in response to the needs of underserved communities.

Theme: Innovation
Keywords: service design, participatory design, dialogue, youth empowerment, grassroots innovation

1. Introduction

Participatory Development with Youth (PARTY) project and service design methodology have helped in "giving a voice" to the marginalized youth in Africa. PARTY project is a research and researcher mobility project funded by MCSA RISE Horizon 2020 program focusing on participatory development with indigenous San youth. Research collaboration includes stakeholders from both the academia University of Lapland, University of Leeds, Cape Peninsula University of Technology and Namibia University of Science and Technology and the third sector. Especially the third sector organisations have been active in the project. These organisations include South African San Institute (SASI), !Khwat tu in South Africa and PACO Design Collaborative in Italy.

Empowerment has been recognised by World Bank (2000) as one of the three pillars of poverty reduction and the subject of debate within the development community. This research investigates how participatory service design process works as an innovation catalyst for youth empowerment in Africa. Through case studies, we illustrate how participatory service design enables and creates the local dialogue between the youth and their stakeholders. Through service design workshops PARTY project helped youth in Namibia and South Africa to identify the problems such as low self-esteem, poor literacy skills and lack of water, develop new solutions to address these problems and present the final outcomes to local stakeholders. Service design process enabled the youth to develop a dialogue with the local stakeholders. These stakeholders often leave the youth aside from the decision-making process. At the same time, the process helped the youth to increase their self-esteem. The youth felt helpful to their communities and proud to be listened by the local stakeholders.

Service design is a tool to develop public-private partnerships and create new service offerings to both accommodate citizen's needs and create competitive social capital for the communities. The value of service design in creating local dialogue is in its ability to concretise abstract contexts and support the ideation and conceptualisation processes, as well as in its support for the innovation process. One of the focuses in PARTY project is to offer practical frameworks and tools that enable designers, researchers and practitioners to understand and manage complex societal development processes where the dialogue between different stakeholders and the youth is needed. In PARTY project, a range of visual, performative and storytelling tools have been adapted, developed and tested through design practice. These are developed further as a tool for creating local dialogue. Being concerned for the society is not a new phenomenon among local developers and designers, but there is an evident need to shift the focus from the single issue of designers' or developers' responsibilities and tasks towards taking a more holistic approach to socially responsible design, creating local dialogue and discussing how this can contribute to the capabilities of communities. How is it possible through local dialogue to deconstruct preconceived ideas about how things should be done and to generate new solutions that could eventually transform and change society?

2. Research methodology

The development of the PARTY model and methods for local dialogue is based on constructive design research which is defined as: "design research in which construction – be it product, system, space, or media – takes center place and becomes the key means in constructing knowledge" (Koskinen et al., 2011, p5). Koskinen et al. (2011) argue that design researchers need methodological and theoretical flexibility and discuss that design can be studied in three contexts: the lab, the field and the showroom. Each of these contexts is characterised by their own research culture adapted from other research traditions: the natural sciences, social sciences and art. Constructive design research is many ways connected to research through design (e.g. Zimmerman et al., 2010, Frayling, 1993), where research and design processes are simultaneous/overlapping and research projects emerge from and with design practice. Design researchers as constructivists conducting research through design practice seek to explain the meaning of the subject by artistically and/or creatively making objects, interventions, processes etc.

In PARTY project, the models and methods have been developed, experimented, tested and discussed through design sessions, workshops and engagements with the San youth and their stakeholders. A series of service design workshops and stakeholder mapping sessions have been developed and conducted with the support from the research collaboration which includes stakeholders from both the academia (University of Lapland, University of Leeds, Cape Peninsula University of Technology and Namibia University of Science and Technology) and the third sector. Especially the third sector organisations have been active in the project, which include South African San Institute (SASI) and !Khwat tu in South Africa, and PACO Design Collaborative in Italy. PARTY researchers create and adapt artistic and creative tools and methods based on the skills and capacities of the design field. Then they work as facilitators in the field where the San youth could recognise their own capabilities and skills and utilize tools and methods to create a dialogue with the stakeholders and community. The outcomes "dialogues" co-created by participants e.g. in the form of performance, pitch, exhibitions, etc. give associations to the showroom. In the PARTY case, the field and the showroom are influenced by artistic and creative movements in the participatory design activities, which help researchers to understand design research as an intentional by product of what designers do naturally in prototype design. Prototypes here include both "dialogues" – as a form of tangible outcomes from

participatory design activities to be used to connect with the stakeholders, and abductive reasoning (Peirce, 1958), e.g. empirical findings, ideas, knowledge – as a form of abstract prototypes to be tested and debated according to their relevance and importance to practice, academia and practicability or feasibility of design and research activities. The process of making, designing (Zimmerman et al., 2010) and prototyping in this case enables more clearly articulated research questions as well as a more detailed description of the planning and execution of the research project.

3. Empowerment ladder

The San youth is not a homogenous group in all aspects but depending on the context (South Africa, Namibia) the youth have different local challenges. Whereas some San youth groups are working with youth who are already in the vocational training or university education, some groups located in more rural context struggle with completing the primary education (Tsumkwe)(Hays, 2011). For developing empowerment ladder that would enable stakeholder dialogue, the base of the ladder needs to be well established (Saugestad, 2006). PARTY empowerment ladder addresses both the challenges in the development of the base of the ladder that focuses on the needs for developing interventions to reduce dropouts in the primary education, as well as the steps that would enable stakeholder dialogue at the local level (Brown & Haihambo, 2015). In the base of the PARTY empowerment ladder there the needs of the San youth who are engaged in the primary education.

Drawing from Rocha's (1997) ladder of empowerment, the PARTY project has developed an empowerment process that addresses the San youth's needs and uses service design approach to enabling the local dialogue. Based on the work conducted with San youth groups and a series of service design workshops that have enabled local dialogues, the journey taken by the San youth creating the local dialogue is summarised below:

1. Participating in a service design workshop to define and concretise the local challenges;
2. Participating in a stakeholder mapping session to identify the right channels for the dialogue and contact relevant stakeholders that should be involved;
3. Participating in service design workshops to develop the content of the dialogue through:

4. a) learning to present the local challenge in a concrete form, for example, in visual or concept format; and b) learning to ideate, conceptualise and create a strategy to implement the proposed solution
5. Participating in the pitching event, exhibition or performance to discuss and gain comments/feedback from the stakeholders

PARTY empowerment ladder	Service design case	Service design tools	Power experience and locus of empowerment (based on 1997)
1. Discover: Identifying and verbalizing local challenge, discover your ability and courage to collaborative action	Creating a social sculpture/ NUU language school Upington	GRACE model, Poster, design activism (artivism), photography, collaborative and participatory workshops	▪ Daily living skills ▪ Self-help ▪ Personal satisfaction ▪ Support ▪ Individual
2. Communicate: Create a message and a storyline, communicate through expanded networks and social media	Message to the Future / Nuu language school Upington	GRACE model Video, storytelling	▪ Self-help ▪ Personal satisfaction ▪ Support ▪ Individual
3. Impact: Developing an informed decision, developing a voice and shared message with the community, making an impact on the community	▪ Training the trainers,!Khwat tu ▪ Radio program *XKfm,* Platfontein ▪ Developing ethical protocol	Co-design, experimenting, video, broadcasting	▪ Knowledge and information for proper decision making ▪ Individual development ▪ Moralized action ▪ Individual/ community

Table1. PARTY empowerment ladder

4. Stakeholder dialogue – Case Radio X-K FM, a local radio station in Platfontein

Many of the PARTY activities are based on youth and stakeholder engagement and generating dialogue and thus learning about each others' situations and learning. PARTY project is focusing on methods that enable empathy, understanding of the real-life situation and ability to contextualise the challenges that the participants have. In the stakeholder en-

gagements and dialogue, there has to be enough diversity to enable multi-vocality and heterogeneity to include variety and diversity of voices.

> "Diversity in stakeholder dialogue is strongly linked to the concept of 'learning'. Learning is a frequently used concept in studies on participation in relation to innovation processes and sustainability. In a stakeholder dialogue, learning takes place through the interaction with other actors. This has been referred to as 'social learning' in social psychology, the idea that interaction between people with different perspectives can lead to the emergence of new insights." (Cuppen 2012)

In PARTY project dialogue between stakeholders is needed to enable learning, empathy and empowerment. The project focuses on studying how service design and creative means can be used to enable this dialogue. How visualisation and storytelling methods can enable learning, empathy and communication between stakeholders? Through dialogue it is possible to understand agency and capacity for initiating and maintaining collaboration and technological or social change, thus identify the opportunities to develop service design methods and design services that support the dialogue.

In March 2017 a series of meetings and workshops were planned by PACO Design Collaborative, South African San Institute (SASI) and the University of Leeds to identify participants from the Radio staff and from the San Youth community to participate in the project. These activities were directed to understand the potential of the project and the intention of the San Youth to participate. Moreover, a series of information was collected about the actual programming at X-K FM radio, the listeners and the role of the radio in everyday life of the community. The workshops revealed that "the youths and the audience demonstrate pride in having a local community radio, but also felt not very much involved and were actually quite afraid of telling us what they thought of it, fearing to upset somebody from the community" (participating San youth). The goal of these workshops was to enable the Youth from the community to produce and broadcast a program on X-K FM Radio.

In April 2017 a series of workshops helped the youth to design and develop the prototype of a radio program to be run by the youth of the community with the help of the radio staff. The aim of the workshops was to provide participants with basic knowledge on how to structure a pro-

gram and generate programme content, starting from topics that came out from previous workshops in March 2017. At the end of the first workshop, the participants simulated the broadcast of the radio program according to the topics they explored. The idea behind this activity, even if the contents were not deeply explored, was to end the workshop with a practical outcome, an audio file of the program recorded on a mobile phone. In the second workshop, participants were divided into three groups and generated three proposals for the radio program starting from the given topics: Lifestyle, Culture and Education, and Employment. The participants formalised the program in 10–15 minutes, they defined the format they wanted to apply, they wrote down the script, and by the end of the day they recorded the programme. The main results of the workshop are the recording of three radio programs that lasts 10 or 15 minutes. The youths had the opportunity to work together with and gain feedback from the Community radio staff and record the programme generated with professional equipment.

In November 2017, the radio staff suggested to integrate topics and related contents generated from the workshops so far into their existing programs, rather than co-creating a brand new program with the youths. This was the best possible solution, because a new independent program must be approved by South African Broadcasting Corporation (SABC) who own and manage X-K FM radio. At the same time integrating the work of the youth into existing radio programs was more feasible in terms of commitment and economic finances. X-K FM radio is always looking for



Figure 1. Workshop session – San youth designing new radio programs. Platfontein, April 2017.

the content and topics that would raise more interest within the community and this opportunity matches with their goal and vision: to uplift and empower the SAN community. Therefore, the project focus shifted from creating an independent programme to co-designing a platform/ service/initiative that would facilitate the youth involvement and participation in the collaboration with the Radio station. The aim of this integrated youth radio initiative was to strengthen the dialogue between the youths and the community, giving voice to the youths through X-K FM community radio. A further aim is also to create opportunities for the youth to get both exposure and training so that to learn new skills and knowledge useful for their future employment.

To investigate the interests of the youths in collaborating with the radio, questionnaires was distributed to the youth in the community through workshop participants who came back after a few days with the results. Four questions asked were: 1. Age; 2. Would you like to have a say in the X-K FM Radio program? Yes/no? Why? 3. If yes-How would you let X-K FM know your ideas? 4. Which role would you like to have when working with X-K FM?

Among 65 questionnaire participants s, nearly two third of the ones below 18 years old said that they would like to collaborate with the radio, and 32 of 37 participants ages between 18 and 27 said that they would also be interested in collaboration. The answers were put in three concentric circles inspired by the Golden Circle methodology of Sinek (2011): Why, How, What. They came up with eight ideas of collaboration: 1. Event 2. Content contribution 3. Internship/ Training program 4. Open mics for youth 5. Youths playlist on demand (Music and topics) 6. Quiz & Competitions for youths 7. Shout outs 8. Management of the Facebook page.

The radio staff was also asked to complete a questionnaire that aims to investigate their interests in involving the youths in the radio program activities, and identify the most appropriate modality. Main questions asked were: 1. Role in the radio; 2. Would you like that the X-K FM Radio collaborate with the San youth? Yes/no? Why? 3. If yes – What do you think San youth can bring to the radio? 4. How would you think this collaboration between X-K FM and youth could be done (E.g. Communication channels)?

The answers gathered from the staff questionnaire were also mapped onto the Golden Circle. The staff's Golden Circle was compared with the youth's Circle developed previously. The comparison leads to a range of ideas for possible collaborations. Then a workshop was run, where the San

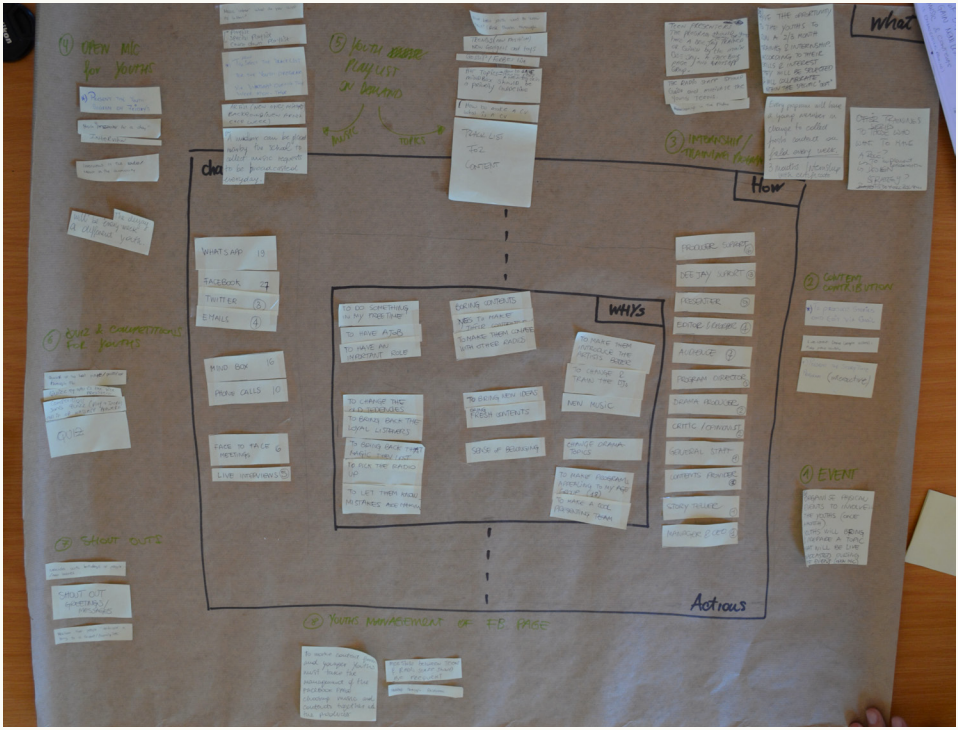


Figure 2. Workshop session – Golden Circle developed by the youth. Platfontein, November 2017.

youth and Radio staff voted for their favourite idea and worked together to design a collaboration system. To define the details of the system, a resource blueprint tool was used to generate a list of actions, stakeholders and resources needed. Through PARTY project, a collaboration has been initiated and set up between the Radio and the San youth in Platfontein, if approved by SABC, the implementation will start in February 2018.

This is an initiative to support the collaboration between the San youth and the radio staff. Through this initiative the youth would have a "voice" in the local media, learn new skills and get exposure and experience, all of which are important for their future employment.

In order to facilitate the implementation of the collaboration between the Radio Staff and the youth, PARTY researchers presented a toolbook developed by PARTY project which is a collection of the tools adapted, created and tested during in the first two years and a half of the project. as a practical manual for planning and organising workshops. Together with the toolbook, a short video was produced to show how the toolbook

has been used in practice. These tools helped and will further support the dialogue and collaboration between the youth and radio staff to co-create the contents of the Radio.

5. Discussion and main findings

PARTY project focuses on investigating the use of service design in creating the local dialogue. The role of local organisations is immensely important in this as well as the local contextual understanding and the respect to the San youth, their community and tradition and contemporary culture. Service design methods enable creating holistic understanding of local context as well as to challenges both the local organisations as well as the San youth and their communities encounter. Service design creates understanding about the concepts related to local empowerment. Meaningful encountering with purpose and action are something that all stakeholders are reaching out. Tools and training are the means for creating capacities that enable dialogue. In the case of PARTY project, this focuses on service design and the use of art and creative tools to create both capacities and meaningful action.

The PARTY process and empowerment ladder utilize artistic and service design methods in order to empower the youth and create the local dialogues. The main prerequisite for enabling local dialogue is in discover one's self awareness, worthiness and sense of self pride as well as ability and courage to collaborative action. We develop artistic and creative tools and methods so that the participation becomes more accessible and attractive for all the user groups and participants, irrespective of education level or experience. The feelings of power are gained through self-control and recognition of the importance of resources available in the surrounding environment at the 'individual empowerment' level in Rocha's ladder. We also experiment the conventional design skill, prototyping as the strength of the design approach that helps the youth develop a better knowledge for problem-solving and action plan generation. From the self awareness of the singular person to the collaborative awareness of the San youth; a positive upgrade that push the youth to become agents of change in their communities. A group of people who share the same life challenges/wishes is able to express more complex solutions than a youth alone. At the same time being agent of change in their home community put themselves in a prominent role in front of the rest of the community members but even more important in front of the local stakehold-

ers who recognise the important active role of the youth. In Namibia, for example, we have been able to organize a public pitch where the San youth of Windhoek have presented to local stakeholders the new concepts designed during the service design workshops and the result was really positive: from one side the youth felt proud to have a voice in the development of their community and from the other side the stakeholders gave positive suggestions on how to implement simple concepts into pilot projects. Together with that, both stakeholders and youth recognized the service design method as helpful in leading the creative process of individuals and groups who never did something similar before. The pitch has been also an important event that enabled the dialogue between the San youth and the local stakeholders who defined themselves interested in being updated on the future developments of the concepts.

The main impact of PARTY project is in discovery phase where the main focus is on use of service design and creative methodologies for supporting self-help and individual growth as well as problem-solving skills that support solution orientations. This was demonstrated especially in the service design workshops facilitated by PACO Design Collaborative.

The short term impact would lay in the discussions and engagement activities with the stakeholders raising awareness of the issues and challenges of the San youth. Development of the framework, process and PARTY empowerment are keys to more long term impact and means for creating more structural change. Raising awareness and dialogue are keys to policy change. This would need more time and large scale local and national effort.

During the research it has been noticed that in order to have positive results using service design methods is really important that the researchers use the appropriate approach. Designing and using the proper tools is important but presenting the tools with the suitable approach is essential in order to have a successful workshop. To work with a marginalised community means first of all to create a common ground where different cultures, different sets of behaviours, symbols and beliefs meet, avoiding misunderstanding. A practical toolbook has been created by PARTY researchers with the aim of being used to organize and run workshops with marginalized communities and more in specific with the San community. The book is structured in different chapters and one chapter is fully dedicated to the engaging phase, and it collects a series of behaviors/rules important to know before starting to work with the San youth. The chapter has been developed with a local association working with the San (SASI)

and an anthropologist. Having a local partner during the workshop session is also really important because they are cultural translators of the local culture. For future researchers, especially for design researchers who are not used to work with marginalized communities it has recommended to understand in-depth the appropriate approach to use.

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Authorship

SM and TT prepared the manuscript, SR participated in the writing of the radio case and ED, EF, DJ and AS worked on the radio case with the youth and radio staff.

Satu Miettinen
Professor of Service Design,
Faculty of Art and Design
University of Lapland, Finland
satu.miettinen@ulapland.fi

Tang Tang
PhD, Lecturer, School of Design,
University of Leeds, UK
t.x.tang@leeds.ac.uk

Silvia Remotti
Co-founder and designer
at PACO Design Collaborative, Italy
silvia@pacollaborative.com

Emanuela Delfino
Designer at PACO
Design Collaborative, Italy
emanuela.delfino@gmail.com

Francesco Brutto
Designer at PACO
Design Collaborative, Italy
brutto.fr@gmail.com

Sara Alonso
Designer at PACO
Design Collaborative, Italy
alonsosara05@gmail.com

Julia Dammann
Project manager at South African
San Institute, South Africa
julia@sasi.org

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Life cycle design

Connecting life cycle thinking with design innovation

Heidrun Mumper-Drumm

Abstract

To create and work within the new sustainability paradigm requires knowledge and methods that fall outside traditional design education, research, and practice. Together with inter- and trans-disciplinary practices, emerging design disciplines promise to contribute to the capacity within design to address this sustainability imperative. Meanwhile, a consumer-centric, 'form and function' design rubric prevails, which discounts, and often excludes, environmental values and goals. Therefore, a new framework is needed, expanding beyond established design competencies, to encompass core sustainability values.

This paper proposes the product/service life cycle as the frame which defines environmental performance, and guides concept development. A methodology evolved from an on-going educational model in which student designers conduct life cycle studies as part of their research. A case study research project is discussed, in which a team of faculty and student designers explored and tested the use of life cycle studies with designers, engineers, and project managers within an international company. The research led to a refinement of the method, resulting in a staged process of design innovation and decision-making.

This paper introduces the use of such life cycle thinking as a critical and rigorous component of designing for sustainability. Observational and other evidence suggests that life cycle data can be integrated into design development, and measurable outcomes demonstrated. From a comprehensive perspective, and with system specific life cycle insight, evidence suggests that design can contribute to environmental improvement, and the achievement of sustainability targets.

Theme: Innovation
Keywords: life cycle, sustainability, innovation, design, systems thinking

1. Introduction

The design of a 'thing' and the system within which it exists and is used, determines its environmental, social/cultural and economic performance, and its sustainability. Whether by intent or not, there is a direct relationship between the design and sustainability. Therefore, can design be applied to improve performance and sustainability? This is a simple but important question. If answering "Yes," we are affirming that the system context, and the specific design brief towards which the designer works and against which the design outcomes are evaluated, must include the goals and criteria that contribute to sustainable systems as we define them. Acknowledging this connection, and tension, between design and sustainability is significant in a number of ways because it changes not just why, but what, and importantly how, we design.

To design within the context of sustainability requires a broad, as well as particular, understanding of the connections and interactions of the product/service with environmental, social/cultural, and economic factors. What research methods and practices provide the designer with this critical information? Unfortunately, there is no one 'sustainability assessment' tool that collectively measures environmental, social/cultural and financial criteria. While 'Eco-footprint' and 'Carbon-footprint' have been suggested as aggregate indicators of sustainability, they do not offer insight into areas of effective design intervention. Life cycle assessment (LCA), in concept and as an analytical tool, can describe the system of product service and indicate specific areas of concern, and therefore objectives for design. LCA evaluates the impacts that accrue over the lifetime of making, using and disposing of a product. Not a new tool, LCA is conducted in accordance with ISO 14040/44 standards, and currently focuses on environmental impacts. Work is being done to include social impact 'hot spots' (Benoit, 2009), though progress is slow.

Design colleges offer many courses in sustainability, however LCA and its application to design is found more often in industrial engineering courses than in the design curriculum. Indeed, LCA is a scientific method and was developed by engineers to analyze and compare operational performance over time, and not for use during the iterative, experimental and synthetic process of designing. While the value of LCA to design has been recognized, the widely employed LCA software tools have limited appeal to designers, and do not as yet integrate well with the creative design process.

1.1 Making LCA a part of the design process and a driver of life cycle thinking and innovation

Highlighting the importance of LCA to design, and its limited use by designers, this paper describes a modified method of LCA that encourages 'life cycle thinking' during the design process. In particular, this paper discusses a method of conducting life cycle research developed as part of the Design for Sustainability curriculum at ArtCenter College of Design. Evidence from work with design students suggests that the ability to understand the life cycle of products and services is an essential outcome of a design education, as are the skills to create sustainable systems of product/service. Further research with packaging designers and industrial engineers, and multiple workshops with consumer goods designers, has resulted in life cycle tools to augment the designer's tool kit.

The method of conducting life cycle research described here is a form of life cycle assessment intended for use by designers, and combines analytical methods new to design with established design practices. It proposes life cycle thinking as a step-wise practice of investigation, visualization, concept development, prototyping, and evaluation. It is different from a scientific LCA investigation, which draws conclusions but does not propose solutions. The method takes what would otherwise be an analysis, disconnected from outcome, and integrates it into design to guide and inspire concept development. The overall purpose is to improve and increase the capacity within design to create sustainable product service systems.

More to the point, each and every design exists within a system, and may be optimized towards sustainability. It is not design that has changed, but rather the outcomes we expect from design. Life cycle thinking can guide the designer towards concepts aimed at improved environmental and social performance. It allows designers to prototype a sustainable system of service. In many cases it represents a shift, a fundamental change in how products and services are sourced, made, used and end their life. Innovation not for innovation's sake, but because new, different and unexpected design approaches and outcomes align with sustainability.

Another aspect of having an effective method for sustainable design is one of urgency. In summarizing prior research, Yilmaz et al. (2016) observed that "Across studies designers appear to consider only a small set of related concepts when generating ideas." How then can designers be encouraged to explore the many concepts, perhaps outside the norm, associated with sustainability? The life cycle method acts as both con-

straint and guide, and perhaps short cut to design, by framing the context to clarify sustainability goals and suggest design strategies. Another way, the constraint allows the designer to work more freely within the framework. This is important because design does not, as of yet, have established patterns or heuristic techniques to facilitate sustainable solutions.

2. Life Cycle Thinking Research

Early in the development of a design for sustainability curriculum, it became clear that course content must define and discuss sustainability as well as provide the student designer with a means of applying these principles. Theory without application has little value to designers who are first and foremost optimistic makers. Important work in this regard had been done by the Okala team of White, St. Pierre and Belletire (2003), whose Okala curriculum was developed around life cycle assessment. Since 2006, this author's curriculum has changed and expanded, as the sustainability paradigm continues to shift our view of the world, and the designer's role in it. The strong emphasis on life cycle thinking remains, perhaps even more so as human-centered design, the circular economy, and zero waste have become core concepts of design for sustainability and are best understood from a system and life cycle point of view.

The life cycle design method presented in this paper is based on eleven years of curriculum development, comprising a synthesis of three different courses within the Humanities & Sciences Department and Product Design Department. An academic course (13 weeks) includes a six-week overview of sustainability, following which students learn how to conduct life cycle research, perform qualitative evaluation and prepare documentation. This academic course is required for a studio course (14 weeks) that begins with life cycle research, quantitative environmental impact assessment, and consideration of social impact. These life cycle studies lead to sustainability goals and strategies for concept development. When possible, studio courses have been sponsored or supported, with past participation from Jet Propulsion Laboratory, The Aquarium of the Pacific, Designmatters, Vans and the Los Angeles CleanTech Incubator. This provided students with direct access to relevant information for their life cycle research and concept development. It also provided a means of testing the method and evaluating the outcomes against the expectations of research, public and commercial entities.

The author and faculty have contributed to this effort: 67 classes taught, more than 1000 students enrolled, and approximately 900 LCAs performed. Further development of the life cycle method, and tools to support it, took place during a multi-year sponsored research project with consulting and in-house designers and life cycle scientists. Currently, and on-going, the method and tools continue to be adapted and formalized; it is design-focused and designer-operated.

While the teaching was not conducted with a view to formal research, the experience has revealed both successes and failures. However, it can be said that *any* familiarity with the concept of life cycle thinking – what it entails, how it is measured, and the vocabulary used – is helpful to a student designer's understanding of sustainability. In a best case scenario (and there were many), life cycle thinking was transformative to the designer and to their design process. It can also be said that student designers appear to have a greater ability to adopt the life cycle approach, while professional designers can be reluctant, resistant and in some cases, uninterested.

2.1 But first, there was life cycle assessment

In brief, life cycle assessments (LCA) are used to account for all of the 'process steps' in the life of a particular product, as well as the energy and materials that flow in, through, and out of each step. The life of a product generally begins with obtaining the material resources and ends with disposal or other 'end-of-life' scenario(s). The product system is represented in a 'stock and flow' diagram, representing the content and boundaries of the system being studied (Figure 1).

An LCA expert models the unique life cycle, using an LCA software program to calculate the potential environmental consequences of the product system according to categories of environmental impact. Impacts may include Air Pollution, Climate Change or Species Extinction (generally, up to nine categories). Or they may be measured in aggregate, as in the Okala score (White et al., 2003, 2013) that combines impacts into a single digit score. During design development, LCAs are generally not included in design research, nor in the process of concept creation. Rather, LCAs may be used to evaluate or compare developed design concepts by industrial engineers, as a means of final vetting or for conformance with company environmental guidelines. For example, a company may be interested in comparing glass with plastic packaging for a food product

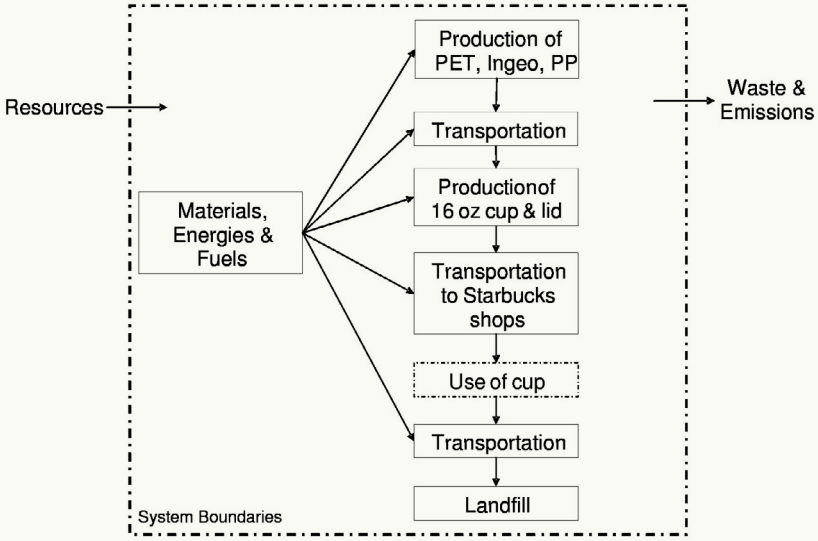


Figure 1. General flow and system boundary diagram for a comparative life cycle assessment of Ingeo biopolymer, PET (polyethylene) and PP (polypropylene) drinking cups. (PE Americas for Starbucks Coffee Co and NatureWorks LLC, 2009)

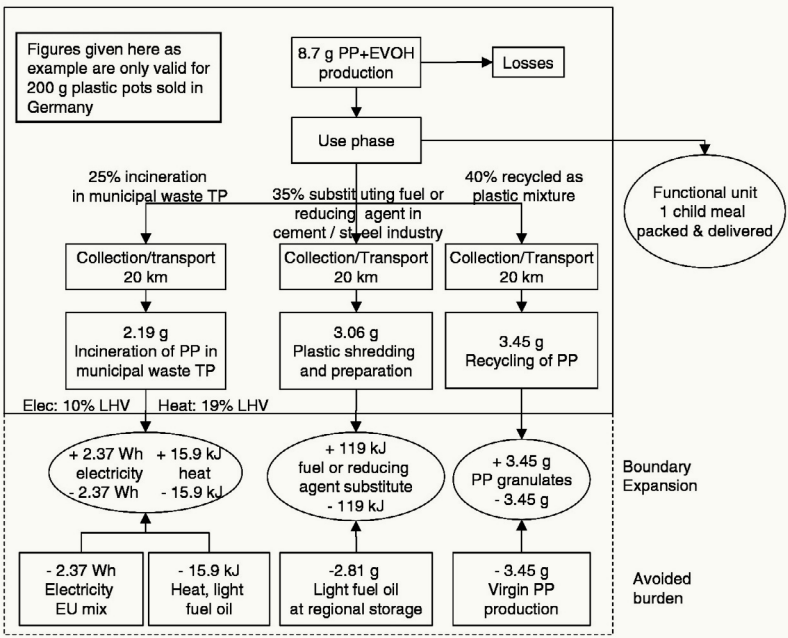


Figure 2. Process tree diagram for a comparative life cycle assessment of two baby food packaging alternatives: plastic pots. (Taken from Humbert et al. for Nestlé, 2009)

before committing to either (Humbert et al., 2009). An LCA may also be used as a basis for making an environmental claim: according to the baby food LCA (Humbert et al., 2009), plastic pots are superior to glass jars (Fig. 2).

LCA is a powerful tool in decision making, and as part of a company's risk management strategy. The understanding of product and system life cycles is increasingly relevant to designers, and for their decision making as well. Importantly, LCA represents a framework for life cycle thinking that can be integrated into the design process.

2.2 Adapting LCA to student designers: Content development & classroom observation

The concept of 'life cycle' is not difficult to comprehend, but conducting the research, representing the life cycle, and evaluating the impacts can be overwhelming to student designers. Various exercises are employed to facilitate learning but will not be described here. The use of tools and processes familiar to designers (such as post-its, mind maps, sketches and diagrams), and design vocabulary (such as typography, symbols and icons), can contribute to making the process less intimidating. Figure 3 shows an early stage student process tree, and Figure 4 the final diagram (Reynolds, 2016). Students are directed to visually represent the system, components, and their relationships (compare with Figure 2 above). The life cycle study is a new skill set for designers, whose purpose is to prototype environmental performance, reveal opportunities, and aid in decision-making. Further, a properly researched and well designed LCA contributes to communicating important aspects of the product/service system.



Figure 3. Early life cycle research representation of medical prescription packaging process tree. (Courtesy Reynolds, 2016)

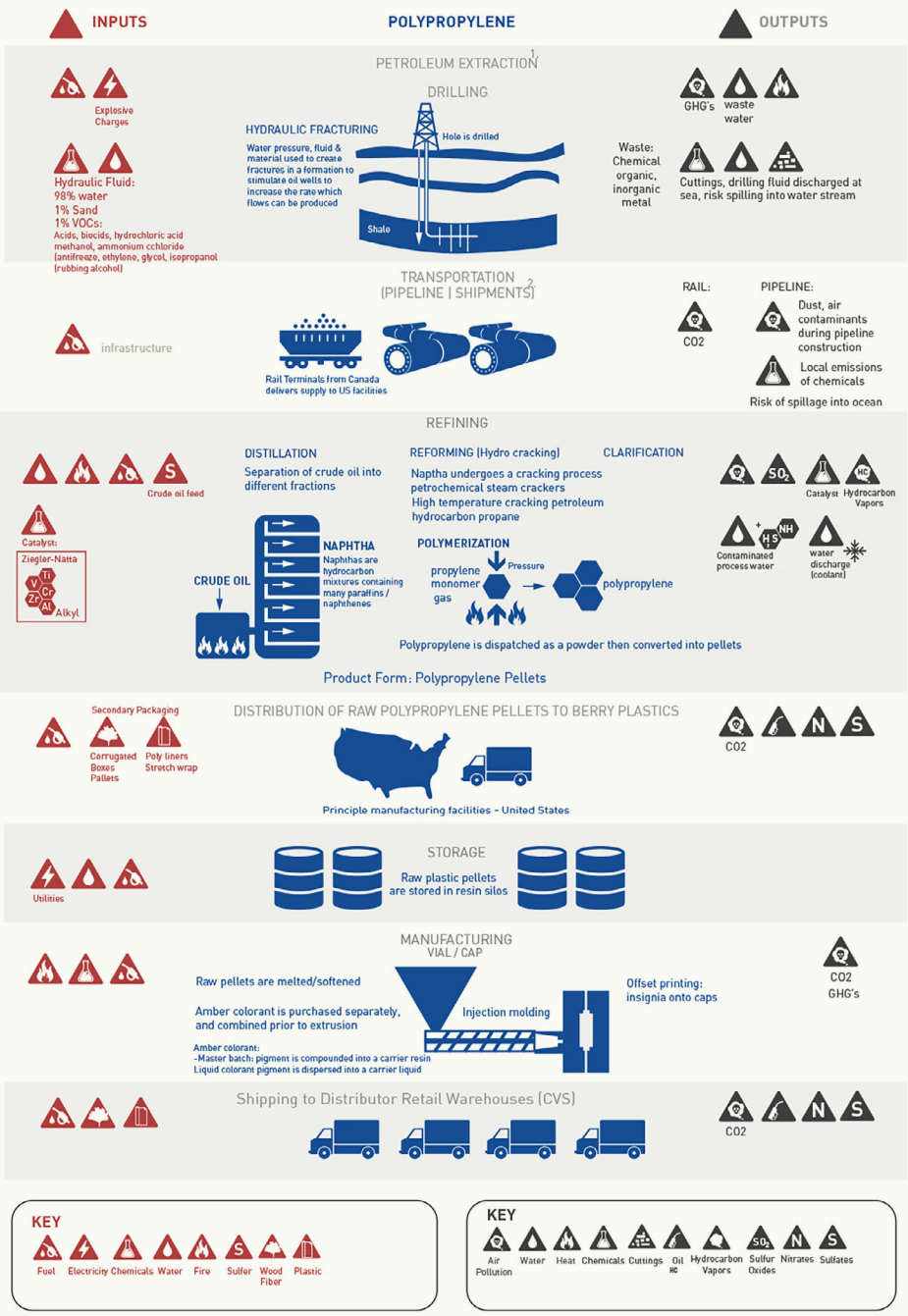


Figure 4. Final life cycle research and process tree representation of reference medical prescription packaging; he polypropylene container is shown here. (Reynolds, 2016)

2.3 But will it work in practice?: Case study LCA research

Research sponsored by Nestlé provided an important opportunity to experiment with, test and expand on the life cycle methodology developed for student designers. In brief, the research focused on Nestlé's use of LCA and their product development process, which includes sustainability as a criterion in the design of packaging and other product elements. Was there an opportunity to integrate LCA with design and product development?

The research followed three phases of investigation: Discovery, Experimentation and Outcomes. Following Discovery, evidence suggested that there was a gap between the life cycle assessment activity and the design activity, as represented in Figure 5. There was no formal or functional relationship between life cycle assessment and design process: the important conclusions of LCAs were not readily available to (or understood by) the designer, and therefore did not contribute to the generation of ideas and design concepts.

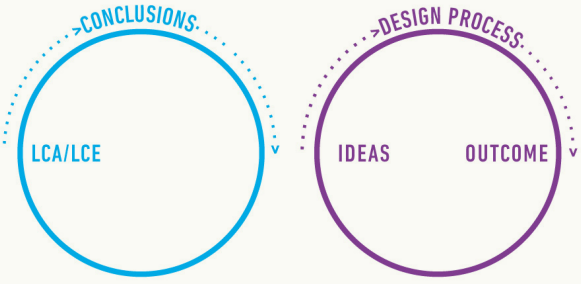


Figure 5. The gap between life cycle assessment and design process.

How to reduce or remove the gap, to allow the transfer of importavnt environmental impact data to the design team when it was needed, became a focus of the research. The research findings supported the method development that had taken place in the classroom and studio, and made significant discoveries and achieved important outcomes within the limits set by the research.

- the life cycle assessment activity and the product development process must be thoughtfully integrated to optimize the benefit of LCA to product outcome,
- a design methodology incorporating LCA can help accomplish this,

- for design teams to understand and use LCA data, the information must be made understandable and useful,
- the use of life cycle icons can aid in visualizing the life cycle system, and may also be used to communicate results, and
- the use of new sustainability heuristics are needed to inspire design ideation and solutions.

A 'laboratory' was created for faculty and student design researchers to conduct their work. Over the course of almost two years, the research team worked directly with Nestlé designers, engineers, managers and LCA scientists. Nestlé provided the ArtCenter research team unprecedented access to experts working in life cycle assessment, design and product development from Switzerland, UK, Mexico, China, Singapore, and the US. The interactions took place in a variety of locations, over multiple dates.

The research team carried out research protocols, many unique and created specifically for this investigation, and documented the outcomes (Table 1). In addition, the research team took the findings and created working prototypes of tools, which were reviewed and tested with Nestlé participants.

	Discovery	Experimentation	Outcomes
Literature review	X	X	
Process mapping	X		
Case studies	X	X	
Sampling/Questionnaire	X	X	
Observation	X	X	
Experimentation		X	X
Field testing			X

Table 1. Nestlé research: Methods employed during three phases of investigation.

3. Life Cycle Thinking Methodology

Evidence from observation and empirical studies of life cycle design process and outcomes, including student LCAs, award winning projects, and LCA and product development case study research, have been combined into a method and a set of life cycle tools. Conceptually, these are intended to bridge the gap between life cycle assessment and design process, as represented below (Figure 6).

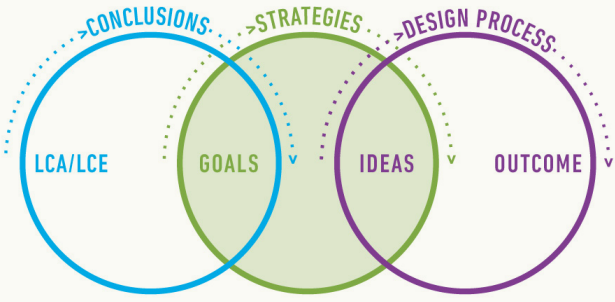


Figure 6. A practical means of integrating life cycle insights with design outcomes.

The important conclusions of a life cycle study (in blue) are translated into design goals (in green). Goals are used to suggest multiple and varied sustainability strategies, which the designer applies in creating design ideas and concepts (in purple). In this way the life cycle results are integral to the design process and drive concept development and design outcomes.

The method consists of activities taking place in stages, each stage building upon the prior one. Certain stages are made up of iterative activities, and may be repeated multiple times. The structure is diagrammed below (Figure 7), and the stages described. Briefly, the designer conducts a life cycle study of Product X or reviews the environmental impact data and conclusions of a comparable LCA. It may be necessary and helpful to review the conclusions with experts in the area. Over time and with continued use, designers will themselves develop expertise, a key step in building capacity within the design discipline. Based on this life cycle knowledge, environmental performance goals for the design are articulated and become priorities for product/service development. To design for these goals, the designer considers a range of strategies and creates product concepts using individual or combinations of strategies. Once the concept(s) become fully realized designs, a second life cycle study is

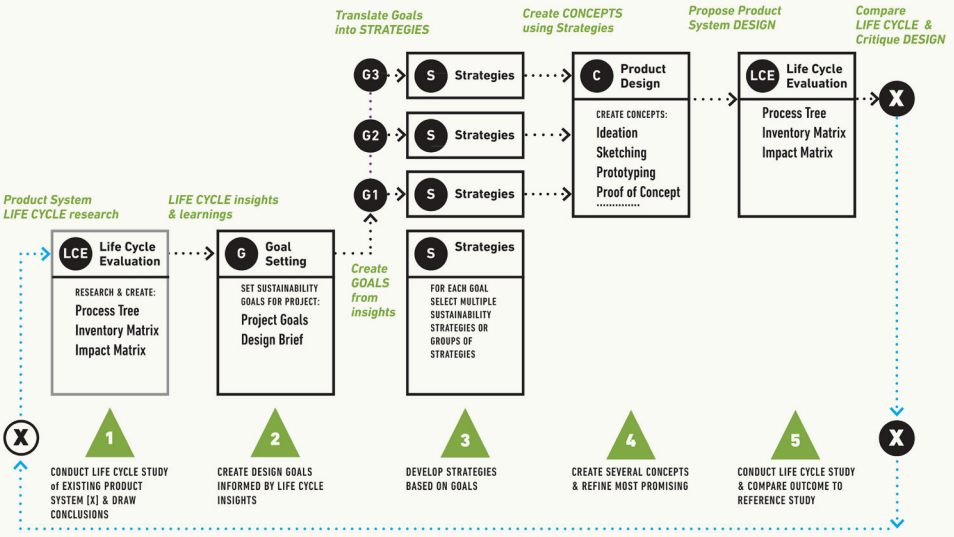


Figure 7. Staged activities driving sustainable product system outcomes: Life cycle design method.

conducted for comparison and to review that sustainability criteria have been addressed. It allows the design team to speak about the new design according to environmental goals met. When the design is finalized, a full LCA may be performed to verify environmental performance.

3.1 Stage 1: Select or create a representative life cycle study

Life cycle studies describe the time-based steps in the life of a product/service, and account for the energy, materials, and environmental impacts at each step. When a designer conducts such a study, a key outcome is to visually represent the life cycle in a diagram. In constructing this so-called 'process tree,' the designer organizes research evidence, verifies accuracy, and clearly represents the structure and nature of the system. A comparison of two process trees, created from the same LCA data (Figure 8) demonstrates the value of a design approach in creating the diagram. The process tree on the left reveals limited information about the life cycle system, and few details. The diagram on the right includes information and details contained in the text of the LCA, but in a visual format. The diagram employs the visual vocabulary and icons developed during the research study. (Please note that a key to the icons would accompany the diagram but is not shown here.)

Having compiled the data, an assessment of potential environmental impacts is performed. An example of an impact assessment of the polypropylene container of medical prescription packaging, as performed by a student designer, is shown (Figure 9). Such an evaluation acts as a 'prototype' the environmental performance of the particular packaging system. The process requires the student to evaluate each process step (listed on the left) in terms of environmental consequence (listed across the top). In introducing student designers to LCA, the evaluation is subjective and based on their research and knowledge of sustainability. More advanced students conduct quantitative studies.

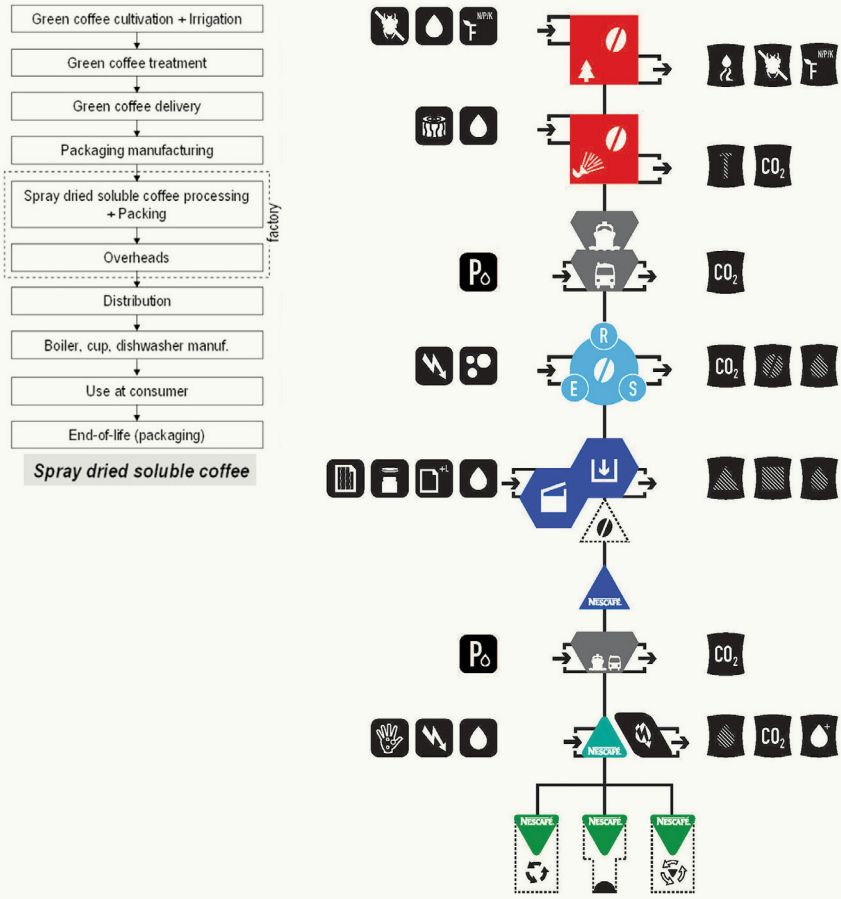


Figure 8. Spray dried coffee LCA diagrams: Left, taken directly from an LCA (Humbert, S., et al., 2009), Right, LCA diagram redesigned to expand and enhance communication and comprehension. (Mumper-Drumm & Saclier, 2012)

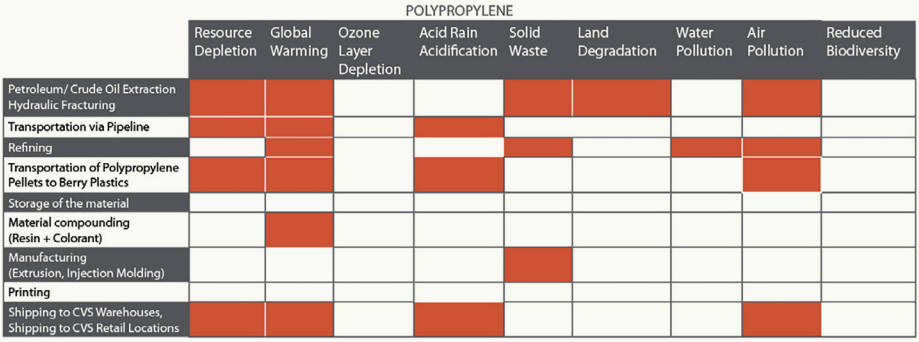


Figure 9. Impact Matrix showing areas of environmental consequence of reference medical prescription packaging; the polypropylene container, liner and label is shown. Colored areas indicate areas of potential impact. (Reynolds, 2017)

3.2 Stage 2: Translate the life cycle impacts into design goals

The environmental impact evaluation is translated into design goals, thereby integrating the LCA conclusions into the design process. In this way, the design becomes a mechanism for carrying out sustainability goals that are linked to the comprehensive analysis of the product/service system context, or LCA. Importantly, the designer becomes the creative agent, putting the entire range of design thinking and making into the task of achieving the sustainability goals.

For the goals to be most effective, and to extend the influence of the life cycle study, case study research demonstrated the importance of stating the goals in a project document, such as a Design Brief. The Brief is a contract that guides all participants, and as such, an appropriate means of including, sharing and tracking success in meeting sustainability goals.

3.3 Stage 3: Select and propose strategies that address design goals

Stage 3 can be facilitated by having, at hand, a wide-ranging set of design strategies that address specific environmental goals, as well as sustainability in general. A strategy is here defined as an action or design protocol. For example, *dematerialization, multi-functionality, design for reuse, use of renewable energy*, or *eliminate known toxins*, describe actions or design practices that can be applied to achieve certain environmental goals. A prototype of such a strategy stimulus tool is underway, which designers

and development teams can supplement with strategies appropriate to the particular area of design and development they are working in. Strategies should be specific to the stated goals, but may also be broad and unexpected so that concept development is rich and imaginative. The use of strategies is meant to provide not only best practice concepts, but also to provoke unexpected, innovative design outcomes. To that end, the tool may be seen as a sustainable design instigator, to which new strategies are continually added.

How effective life cycle thinking can be as a design innovation method may be seen in the number of student projects awarded design recognition. Students projects developed using the life cycle framework have received important design awards, sustainability scholarships, and publication in design books (Reis, 2010). In addition, on the basis of their particular work in sustainable design, and for the rigor of the research that accompanies it, students have received internships and professional positions on graduation.

3.4 Stage 4: Create design concepts

Using individual strategies and groups of strategies designers create concepts that directly address life cycle impacts and improve life cycle performance. The strategy tool described in Stage 3 is meant to support and expand this concept development process. Designers are challenged to create many different, new and inventive concepts, and to select those with the greatest potential to achieve sustainability goals.

3.5 Stage 5: New life cycle study; Iterative concept testing & development

An important part of the design process is 'critique,' or a critical review of the design outcome. Conducting a second life cycle study makes it possible to perform a critique of sustainability, in a measured and process driven way. The initial LCA to establish the design goals, and the LCA of the new design concept, may be compared, environmental impacts contrasted and achievement of goals discussed.

If moving into production, the final design(s) may be examined further using a quantitative assessment, especially if certification or an environmental claim will be made of the product system environmental performance.

4. Discussion & Conclusion

The question under investigation can be restated: by understanding life cycles, can designers create product service systems that meet new, rigorous, environmental performance standards? As presented in this paper, evidence from design teaching and product development research supports the conclusion that life cycle thinking, as a core practice of design, supported by analysis and guided exploration, must become the new norm. 'Business as usual' design has many risks associated with it, and inability to address the shift to sustainability is one of them.

Designing for sustainability is becoming an accepted and necessary design practice as designers, businesses, governments and society seek to address the consequences of consumption. Yet despite the many sustainable design guidelines (principles, protocols and systems-based procedures), there is little consensus within the design or business community as to how, or by whom, 'sustainable design' is best accomplished.

This paper argues that consideration of the life cycle of product and service is a critical part of design. Writing in another context, Hoffer states, "Life cycle is not a model we fabricate and impose upon the past. It is the reality we now discern" (Hoffer, 1983). Designers, more than ever, must discern and know the 'reality' of the environmental, economic and social systems they are working within, so that they may creatively model and design environmentally responsible product system life cycles.

Without the life cycle framework, the designer is at a disadvantage. A rigorous approach to sustainability is urgently needed within design education, practice, and professional development. Taking Humbert's LCA conclusions further (with addition by the author, in italics), "To minimize the environmental burdens directly related to their products," *industry must co-align their activities with those of designers and LCA specialists*, and include "all processes of the entire supply system of goods and packaging, distribution and final purchase transport, but also the consumption of goods" (Humbert, 2009). More to the point, design education must prepare design students with the methods and tools to enable life cycle thinking.

4.1 Limitations

The results that form the basis of the life cycle method come from extensive experience with art and design students, and focused research with professional designers and development teams. As of yet, the method is

not practiced outside ArtCenter. This is a serious limitation and must be addressed if adoption within professional practice is to take place.

A Life Cycle Alphabet of icons and Strategy Stimulus Cards were developed as part of sponsored research. Both tools have great potential and only time and funding is preventing their further development.

A more general limitation may be stated about the life cycle method itself. Life cycle assessment is a powerful tool, but it is never as complete, comprehensive and accurate as we would wish. Therefore, designers must always be aware of these inherent and imposed limitations of the life cycle study (because there will always be limitations) and refrain from overstating the environmental 'benefits' of the design.

4.2 Conclusions

While it is difficult to demonstrate in this paper, the ability to study environmental performance makes it possible for designers to evaluate their work, make changes, and prepare design outcomes that are demonstrably 'better,' on the basis of a life cycle evaluation. As has been stated before, the rigor of the life cycle framework introduces a robustness to the design that would not have been possible without it. Such a predictive and prescriptive approach, as pointed out by Margolin, is fundamental to teaching and learning, that "...should predict future outcomes based on empirical data, whilst...it should blend subjective ideas based on ethical directions for the future well-being of environmental and human resources." (Margolin, 2007)

Life cycle thinking also demonstrates to the student designer that goals can drive their design, not just cost. That ideas can be found in unexpected places, such as in chemistry, the garden, and not just in the current marketplace. The life cycle framework provides designers with a means of trying out these ideas in a way that offers context, insight and is future-looking.

Designers, being very process-oriented, have always looked to tools to make the process better, faster, and more effective. Certainly, tools and practices will continue to be developed as the mandate for sustainability is implemented. Those briefly described in this paper hold much promise, both as a means of designing, and as a means of evaluating and continuing to improve the design.

- To enable life cycle thinking and effectively use LCA results, especially for product/service system design and development, the LCA format is modified to be more useful to designers. In particular, LCA is used to establish the sustainability goals for the design.
- Creating and visualizing the process tree life cycle diagram has been demonstrated to be a valuable research activity for the student and professional designer, and can serve as an important communication tool for designers and product development teams, and other stakeholders.
- To facilitate the process tree visualization, a system of life cycle shapes and icons may be used. This system is adaptable to a variety of product systems, and can be augmented and customized. It creates a common and cohesive visual language for life cycle communication
- Strategies are an important part of the design process and decision-making. In this life cycle method of concept development, strategies are used to suggest design directions that help achieve goals determined by life cycle insights.

The author would like to acknowledge ArtCenter College of Design students and faculty, and research participants, who contributed their creativity and expertise to the development of life cycle thinking.

Heidrun Mumper-Drumm
Professor, director Sustainability Initiatives,
ArtCenter College of Design, USA
mumper.drumm@gmail.com

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Unlocking innovation through design thinking training for university students

Keneilwe Munyai

Abstract

Design is slowly gaining traction as a strategic tool for problem solving in various context through the approach of design thinking, which uses tools and techniques from the design discipline, social sciences, engineering and the business world. Design thinking is an approach to develop innovative solution to complex problems. The design thinking approach minimizes the risk of innovation, by engaging directly the people impacted by the challenge one is trying solve to gain insights from the source, it is also iterative and encourages the development of low-fidelity prototypes, which can be tested with the users to learn from real people. Design thinking brings together people from different disciplines, cultural backgrounds and nationalities to work in multidisciplinary teams. Empathy is one of the core mindsets of design thinking. It requires that one build strong teams that understand and value the diverse perspectives. This approach has a great potential to addressing some of the complex challenges that face many African countries like South Africa. I argue that we need an empathetic mindset to innovation that leads to better understanding not just of what the problem is, but also the people impacted by it. Through empathy we get to understand ourselves, our own biases, prejiduces and world views. The collaborative approach of design thinking taps into some of the traditional african practices such as the philosophy of "ubuntu" which is about understanding that a person is partly forged in the community. Design thinking help in emphasising the value of empathy particularly in the African context when working on projects. This paper will reflect on the teaching and application of design thinking in South Africa and Africa continent and why understanding context and gaining empathy might lead to a more human-centered innovation.Under the theme together, how to foster innovation, this paper unpacks how design thinking training for university students has become a valuable tool to foster empathy and collaboration which result in innovative outcomes for none-design students in South Africa. Design thinking gives an opportunity to those who are not trained as designers to learn the mindset, principles and tools of design thinking in order to be able to collaborate and innovate. Furthermore, the process builds strong teams that use design thinking as a common language. Teams are considered to be the foundation of a successful workplace and preparing students for the workplace is important.

Theme: Innovation
Keywords: collaboration, design thinking, education, empathy

1. Introduction

Design thinking emerged from an exploration of theory and practice in a wide range of disciplines and sciences as a means to addressing complex and ambiguous challenges that face society today (Kimbell, Agit, 2015). Early references of design thinking can be seen from the 1950s, more within the context of design disciplines. In the 1950s Buckminster Fuller coined the term design science revolution to describe his proposed scientific and socio-economic revolution which he thought could be accomplished by shifting from waponry to livingry through the application of wht he called anticipatory design science (Fuller, 1956). At the core of the anticipatory design science is bringing together disciplines that are viewed as being far apart to solve complex challenges that go beyond single discipline such as youth unemployment and enviornmental pollution. Hebert Simon was the first person to talk about design as a science or way of thinking. He through the process designers follow could be applied in none design problems and through developing low-fidelity prototypes we could get a better understanding of the context and system in which the problem one is trying to solve exist (Simon, 1969).

Bryn Lawson, explored the difference in the way scientist and designers approached challenges. Scientist focus on the problem, while designers tend to iterate to find the best possible solution. By bringing together these two approaches can add great value to society as it helps in ensuring that the problem that is being solved is the right one and the proposed solution is the best possible solution.

Design thinking is important for developing strategy in organizations as well as for innovation that is informed by those impacted by the problem being solved. Design Thinking does not require one to be trained as a designer to be able to learn the design tools and techniques to apply in complex problem solving. Many organizations globally are starting to realize the value of incorporating design as a management tool for project, as a business strategy tool and as a professional development tool. This takes design beyond aesthetics and product development. However, design as a professional development and leadership requires certain competencies which are not taught or even encouraged by academic institutions.

The World Economic Forum suggested top 10 skills that existed in 2015 and the skills required in the future. These skills are creativity, problem solving, critical thinking, collaboration, emotional intelligence which are key components of the design thinking training and they are considered to be the top five skills which will be crucial in 2020 (World Economic Forum, 2015). However, in order for these skills to happen there needs to be a change in the way we teach. There also needs to be an interaction with industry and other related stakeholders in order come up with new strategies for the necessary change required to equip students with the necessary skills.

Some of the strategies include exposing those that develop the curriculum to industry projects gives them an opportunity to learn and bring content that is relevant to their teaching space. Equally, working with industry partners also gives the student an opportunity to learn about the environment they are aspiring to. Education should be the driver of the necessary change that is required.

1.1 Education in South Africa

The education system in South African has been facing a lot of criticism about its failure to produce graduates that are able to contribute positively to society and that the industry finds useful. Lie 2007 suggests that graduates, employees, government and universities should work together. Graduates are more academically oriented and lack awareness of the latest developments and applicable skills (World Economic Forum, 2017).

Lie (2007) argues that graduates, employers, government and universities are all involved. Graduates are more academically oriented and lack awareness of the latest developments and applicable skills. Graduates generally believe that their education and skills are sufficient and universities consider their graduates to be well prepared for the workplace. At the same time, employers perceive graduates to lack the vital skills for employment. Such perspectives must be addressed to enhance the employability of graduates.

The South African economy has been experiencing rising unemployment over many years, in 2011, the youth unemployment at 24.2% and it increased in 2013 to 25.2% (Statistics South Africa, 2014). At the same time, there was a structural change observed in labour demand trends shifting towards high-skilled workers (Bhorat & Jacobs, 2010). This structural change has led to the conclusion that the unemployment problem

in South Africa is structural, that the poorly educated workers, who constitute the vast majority of the labour supply, cannot find employment due to insufficient demand for low-skilled resources (Pauw, Bhorat & Goga, 2006; World Economic Forum, 2017).

There is also a growing realization that the curriculum or the way we teach and what we teach in South Africa has a role to play in the type of graduates that are produced. The realization that the education system produce graduates who lack the ability to solve complex problems and are not able to collaborate (UNESCO, 2015). They may have the will, but they lack the knowledge of how to tackle problems as well as institutional support. This has partly to do with previous social imbalances.

Debating the educational challenges should feed into the desired knowledge and skills required to solve contemporary challenges and produce graduates that answers the continent's needs and challenges, notwithstanding that African knowledge cannot exist is isolation. UNESCO (2015: 16 & 17) defines education as learning that is deliberate, intentional, purposeful and organised. However, Learning is viewed as the process of acquiring knowledge. While knowledge is understood as the way in which individuals and societies apply meaning to experience. It includes information, understanding, skills, values and attitudes acquired through learning.

Mark Taylor criticized the current model of university training calling it a mass-production university model for "ever-increasing specialization" leading to "separation where there ought to be collaboration" (Taylor, 2009). The education process needs to teach students to collaborate it also needs to be linked to the local context. Therefore, design thinking training is an approach used to address some of the above-mentioned challenges from a South African perspective.

2. Method

This paper will reflect on the teaching and application of design thinking in a South Africa and why understanding context and gaining empathy might lead to a more human-centered innovation. A lot of reseach and has been done on the value of design and design education from a developed world perspective.

There is a great need for a different approach to teaching and learning in order to produce graduates that can make a valuable contribution to the work environment and society. Design thinking takes a reflective

approach to teaching and learning wich empowers the teaching staff to be thoughtful. The teaching in design thinking involves is more than acquisition of knonweldge it is also about personal development and gaining valuable soft skills. Design thinking also incorporate soft skills interpersonal skills, communication skills, listening skills and empathy. Students that participate in the programme come in with hard skills which are job specific. According to the world economic forum (2017: iii) Currently trending professions on the African continent include the creative industries. However, this trend has not translated in a shift in seeing the role design as more than product and aesthetics. But rather as a strategic tool to inclusive and meandingful innovation.

The training that is discussed in the paper is three months long. Geared towards postgraudate students within the university of Cape Town. The students are persuing a masters, PhD or Postdoctoral studies. The students come from various faculties and disciplines within the institution.

Students work in teams of 5–6 diverse individuals. They team are created using a set criteria of diversity. Diversity is any significant difference that distinguishes one individual from another. The description covers a broad range of obvious and hidden qualities (Kreitz, 2007). The obvious ones are cultural diversity, educational background, language, age, gender and skills. The students are supported by a design thinking coach who serves as a guide, adjunct memebr of the team, in order to provoke change in the way the individual interacts with others.

The students meet and work together twice a week over a period of 12 weeks. None of the students in the programme have any formal design training.

3. Design thinking training

The Hasso Plattner Institute of Design Thinking has been at the core of training and capacitation in design thinking since 2004. The first school of design thinking was established at standford university in California. The second school was established in 2007 at the university of Potsdam in Germany. The third in the schools of design thinking was established at the University of Cape Town in South Africa in 2016 (See figure 1).

The three schools of design thinking share and develop teaching, training and research in design thinking. Design thinking training is about equiping none design students with extra skills sets that they can apply in their daily lives and in their proffesional environments.

However, the focus of this paper is on the South African school of design thinking. The students at the that come into the HPI at UCT design thinking programme already have disciplinary knowledge as they are persuing postgraduate studies. These students form part of the less than 20% of the population that attends tertiary institutions in South Africa (World Economic Forum, 2017). Africa need to build future skills not just copy methods from elsewhere as the context is different, teaching design thinking in South Africa allows for exploration of context relevent solutions. Since non of the participants in the programme are designers the programme is not about turning them into designers. It is about teaching them different ways of working, soft skills, collaboration and the value of empathy and putting people first.

Design thinking is about teaching design tools and techniques to non designers. The design thinking trainining is project based, experiantial, action-based learning and collaborative learning. The projects that the students work on vary government, private sector, NGO and university (see figure 2). The project partners partner with the HPI at the university of Cape Town to have their chalenges explored by the students. The project partners are looking for ideas, new perspectives into the challenges that they have been grappling with. The students on the other hand get expo-

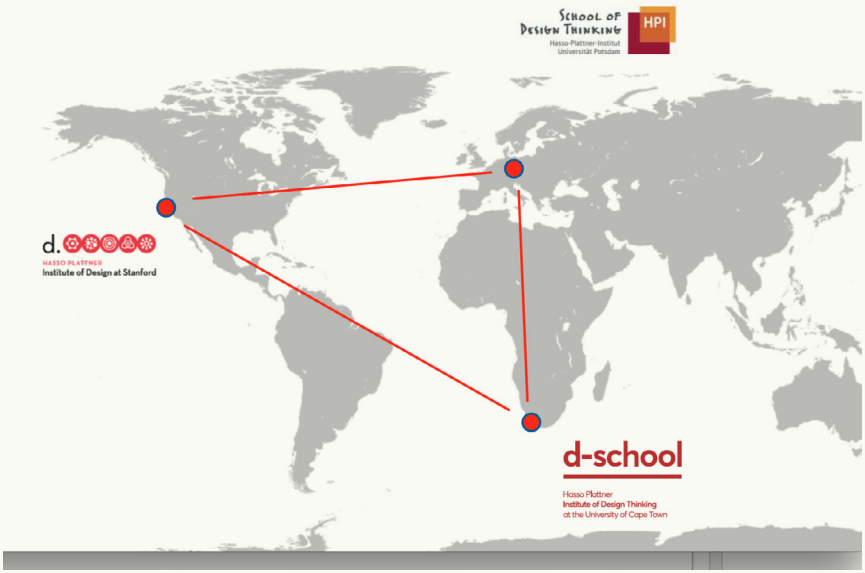


Figure 1. The geographical location of the three Hasso Plattner Institutes of design thinking

sure to various industry complexities. They get to learn to about the challenges and learn to use various tools and techniqiues to solve the challenge in a team environment.

This means that participants in the programme learn various skills that will prepare them for the future work environment that diverse and dynamic. Action-based learning theory is based on the belief that learning is most effective when it is orchestrated around meaningful activities that require learners to be actively and meaningfully engaged with the learning process and the learning resources (Naidu, 2012).

While in project based learning the problem serve to organise and drive activities that culminate in a solution that address the problem, this is considered as the core to reflective thinking which should constitute the goal of education (Dewey, 1933; Stockholm, 2014). In experiential learning the main purpose is to make and embody an idea in material form, it also involves purposeful play while also solving a problem and acquiring skills (see figure 3).

Students of of design thinking learn more about social needs through real world problems and how they are currently addressed and try to find possible solutions that meet the needs (see figure 3). Finally, collaboration is another key element which requires participats to solve a problem



Figure 2. The 2016–17 project partners who brought their challenges to

and perfom tasks together. Therefore, design thinking from a teaching and learning perspective can be defined as the sort of action learning that comes from collaborative exploration that is failure-friendly, iterative, where low-fidelity prototyping is important and where contexts of immesive research in order to understand the problem and propose a context relevent solution. It Is a combination for different layers. One is the mindset, one is the method and one is the culture (Schmiedgen, Köppen & Meinel 2015:36). According to Fardinpour,Reiners and Dreher (2013) there are different types of action-based learning and what they all have in common is that they are goal or problem oriented. A humanistic and holistic approach to education can contribute to achieving new development models (UNESCO, 2015). The values of design thinking from a south african perspective are human-centered, local context and creative exploration. We teach design thinking from using tools and process (see figure 4).

The key values of design thinking from a South African context are to promote human-centeredness, contextual relevence and creative exploration while learning to move beyong the influence of individualistic approach in teaching and learning as well as to emphasise a participatory and inclusive approach that takes into account the diversity of the context, local knowledge ecosystem and the realities of the context.

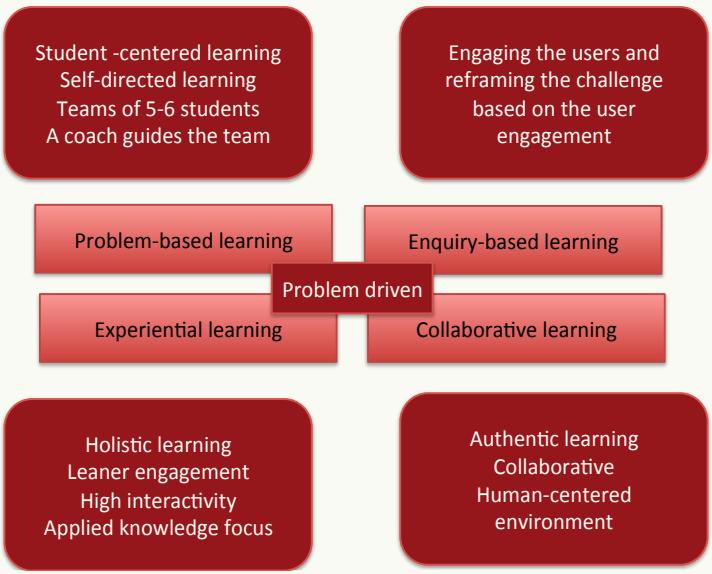


Figure 3. Design thinking education combines four key elements

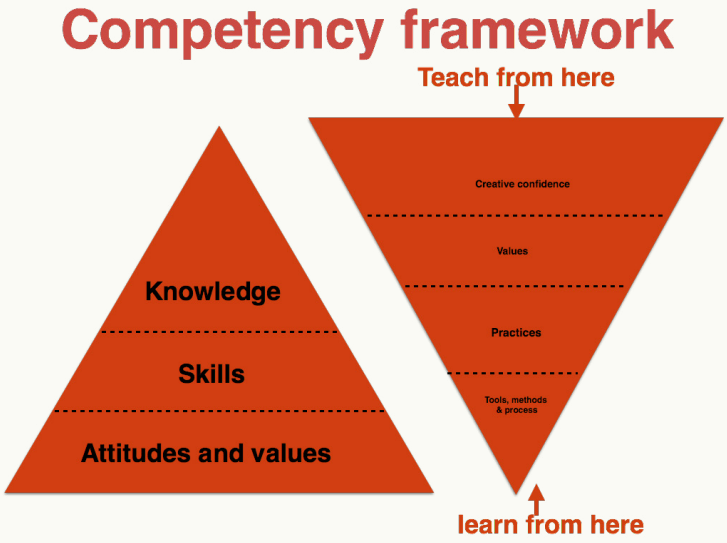


Figure 4.1: Education competency frame work.

Figure 4.2: Design thinking education framework indicating teaching and learning.

People	Place	Practice-purpose
Values		
Human-centered	Contextual relevence	Creative exploration
Guiding principles		
▪ Openess & transparency ▪ Empathy ▪ Radical collaboration ▪ Embracing diversity	▪ Understand local context ▪ Context relevent solutions ▪ Resilience ▪ Socio-economic sustainability	▪ Purposeful play ▪ Be comfortable with ambiguity ▪ Curiosity ▪ Bias towards action ▪ Embrace constraints ▪ Be optimistic ▪ Divergent and convergent thinking
Practice and mindset		
▪ Problem framing ▪ Seek feedback ▪ Defering judgement ▪ Fail early and often	Collaborative spaces	▪ Build to learn ▪ Be visual ▪ Iterate ▪ Abductive reasioning ▪ Encourage wild ideas ▪ Go for quantity

Table 1: Framework for design thinking in South Africa

The above framework indicates the values and guiding principles are taught and emphasised through activities that are developed and introduced at various strategic points of the project and students learning journey from the South African perspective.

3 Empathy in innovation

Empathy is considered one of the soft skills required to succeed in life and the work environment. Soft skills are defined as personal attributes, personality traits, inherent social cues, and communication abilities needed to succeed on the job. They characterise how we interact in our relationships with others (Matteson, 2016).

Empathy is a key element of emotional intelligence, the link between self and others, because it is how we as individuals understand what others are experiencing *as if we were feeling it ourselves (*Goleman). Empathy was proven to have facilitated the development of cultural competencies and reduce prejudice and racism (Einsberg, 1987;Dixon, Durrheim, & Tredoux, 2007). Empathy plays an important role in improving intergroup relations. It is an explicit component of the conflict resolution used to foster mutual understanding between members of opposing groups (Burton, 1986). Empathy may therefore be understood as a personality trait or as a situation-specific cognitive–affective state, where the empathic experience varies by situation (Duan and Hill, 1996). More to the point for the present work, empathy can be seen as a multi-phased process, involving a sequence of experiences (Barrett-Lennard, 1981). According to Hodges and Myers (2007), Empathy is perhaps better conceptualized as something that emerges from a complex interaction between characteristics of the target of empathy and that target's situation and the traits, experiences, and motivation of the empathizer, all embedded in a larger cultural context. Relationships that we have inform our self-understanding, who I am as an individual depends on many 'others' family, friends, culture, community and work colleagues. Hence the These values are meant to promote and embody the concept of *Ubuntu* using design as a strategic tool to achieve this goal. *Ubuntu* has its roots in humanist African philosophy, where the idea of community is one of the building blocks of society (Khomba, 2011).

The values helps us realise that we are part of society and when we try to come up with solutions to complex problems we should put people at the center of what we do.

This requires that we gain empathy for the people that we are developing solutions for and move away from designing for, to designing with. The teams need to gain empathy for others which is about understanding the peaple and their context.This enables teams to be able to design context relevant innovations. Empathy is one of the core mindsets of design thinking. Therefore, true innovation requires that we gain an understanding of ourselves in relation to others. Empathy is embodied by to the philosophy of *ubuntu "I am because we are"*.

Three types of empathy are defined as cognitive empathy and two types of emotional empathy, reactive and parallel (Stephan, and Finlay, 1999). Empathy play a central role in human behaviour (Hogan, 1969). Cognitive empathy," sometimes called "perspective taking," refers to our ability to identify and understand other peoples' emotions. Cognitive empathy is the ability to put yourself into someone else's place, and see their perspective (Smith, 2006). This is important in a collaborative space where understanding the team member's perspective and reality is important. Cognitive empathy refers primarily to taking the perspective of another person (Stephan, and Finlay, 1999). It is a useful skill, particularly in negotiations. By collaborating with other cultures and disciplines forces individuals to understand other people's experiences. Understanding other people's experiences will lead to great empathy for others.

Empathy is often described as either an affective phenomenon ('affective empathy'), relating to the emotions of another person, or as a cognitive construct ('cognitive empathy'), referring to the intellectual understanding of another's experiences (Bachelor, 1988; Duan and Hill, 1996). Furthermore, emotional empathy refers primarily to emotional responses to another person that are similar to those the other person is experiencing (parallel empathy) or are a reaction to the emotional experiences of the other person (reactive empathy) (Stephan & Finlay 1999). Another aspect of empathy is called somatic empathy extends beyond the dyadic relationship of the team and into the community (Korn, 2013).

Design thinking go through various divergent and convergent thinking in trying to understand the problem and come up with the best possible solution. It is during the divergent and convergent thinking phases that the team members where empathy is becomes evident from the individual team member's perspective. During the divergent thinking phase the team is sharing thoughts, perspectives and ideas and it is important that they feel heard and that their views are valued.

The students are guided through the divergent and convergent thinking phases through activities that help the team navigate the problem and are also meant to emphasise the idea of having empathy for people. True empathy to other people's worldview also requires patience and leads to better collaboration and better innovations. The diversity of the student in the programme makes the concept of empathy move beyond just focusing on the users. Gaining empathy for the team members with different world-view who might see the same challenge from a different perspective is key to successful collaboration.

3.1 Collaboration

Collaboration is about bringing people from diverse backgrounds together to work towards a common goal. Design thinking is a team methodology, its strength is in the diverse multidisciplinary teams. Paricipants work in teams of 5–6 individuals from diverse backgrounds. Diversity has four dimensions, personality, internal characteristics Age, gender, disability, education level, ethnicity, language, life experience, nationality, race, personalities, religion, external characteristics which include culture, nationality and socio-economic class (Kreitz, 2007). Through collaborating with people who are different from them in many ways the students develop cultural competency, communication and social skills.

The design thinking methodology helps teams navigate complex problem to possible solution in a structured manner is well documented. However, the application of design thinking to navigate cultural, social and economic complexities in order to build functional teams in design thinking is not well researched.

Because of the diversity of the context in South Africa it is crucial that students are made aware of cultural and social complexities. Taylor (2009), argues that the separation of collaboration from the education system leads to knowledge that becomes self-serving rather than adapted to meet needs of society – "Each academic becomes the trustee not of a branch of the knowledge," Taylor writes, "but of limited knowledge that all too often is irrelevant for genuinely important problems." "A single tree cannot make a forest." Or "When spiders unite they can tie up a lion" *African proverb.*

Collaborative work and the team building process plays an important role in solving complex problems. Taylor states, "but of limited knowledge that all too often is irrelevant for genuinely important problems."

Friedrich Hayek also observed that (Hayek1945) that “Each member of society can have only a small fraction of the knowledge possessed by all, and each is therefore ignorant of most of the facts on which the working of society rests… civilization rests on the fact that we all benefit from knowledge which we do not possess. Bucciarelli (1997) define design thinking as a social process in which teams negotiate decisions. He further states that each participant possess an ingrained set of technical values and representations that act as a filter during the team interactions. We can sum the three ingredients to the training using the diagram below (see figure 5)

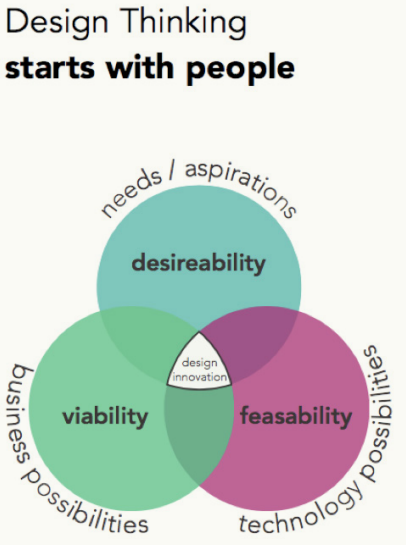


Figure 5 Process, people and place are important to collaboration

One of the ways in which civilization helps us to overcome that limitation on the extent of individual knowledge is by conquering ignorance, not by the acquisition of more knowledge, but by the utilization of knowledge remains widely dispersed among individuals (Surowiecki, 2005). Collaboration does not take away from the individual, the individual needs to find its place in relation to others in a team and outside of the team space (Buchanan, 1998:19; Simon, 1969; Rowe, 1987) (Buchanan, 1992) (Schon, 1983; Schon; 1987).

Proper collaboration requires certain attitudes, values, goals, and practices that are based on interdependent work. Not silo-based work, but collectivist nature that develops relationships between individuals. The diversity in teams in terms of cultural backgrounds as well as nationalities adds another dimension. Friedrich Hayek’s observation in the use of knowledge in society (1945) is that “Each member of society have only a small fraction of the knowledge possessed by all, and each is therefore ignorant of most of the facts on which the working of society rests… civilization rests on the fact that we all benefit from knowledge which we do not possess. Hence, the importance of collaboration as it is an opportunity to learn from others as well as contribute what we know design thinking methodology allows for the

interactions between people from different disciplines and cultural backgrounds to collaboratively work towards a common goal of solving a complex problem.

3.2 Collaborative Innovation

Innovation is a process of developing new or improving existing methods, practices, ideas, products, services or systems that meet the needs of the people impacted by the innovation. Quality innovation applies to action, modes with which activities are undertaken. The practive is perfomed in various ways with distinct paces, pressures and mindfulness. Work style in design thinking is the ground for practice, which coordinates actions and makes them meaningfully part of practice (Tonkinwise, 2011).

In design thinking teams it becomes possible to get different perspectives on the innovation due to the diverse transdisciplinary teams. The teams are also required to go and engage with the people that are impacted by the problem they are trying to solve in order to gain a better understanding of what the real problem is and the system or context in which it exist. This aspect is particularly important in the context of South Africa due to diversity of the country and cultural differences.

> "one head does not exchange ideas" African proverb

Innovation in design thinking combines three key elements, it starts with people's needs, combined with business posibilities and technological feasibility (see figure 6). It is about finding the right balance between these three elements.

Often problems In design an many other disciplines are solved in a studio environment based on people's biases and these result in innovations that do not resonate or do not add value to the contex in which they are meant for.

4. Conclusion

In this paper I reflected on the teaching and application of design thinking in the South Africa context and why understanding context and gaining empathy might lead to a more human-centered innovation. I also unpacked how design-thinking training for university students has become a valuable tool to foster empathy and collaboration that result in

innovative outcomes for none-design students in South Africa. Design thinking gives an opportunity to those who are not trained as designers to learn the mindset, principles and tools of design thinking in order to be able to collaborate and innovate. These are all important skills that are required for the future work environment. Furthermore, multidisciplinary teams play an important part and leads to the emphasis on empathy. The collaborative approach of design thinking taps into some of the traditional african practices such as the philosophy of "ubuntu" which is about understanding that a person is partly forged in the community. An empathetic mindset to innovation that leads to better understanding not just of what the problem is, but also the people impacted by it. Through empathy we get to understand ourselves, our own biases, prejiduces and world views.

This approach to education has a great potential to addressing some of the complex challenges that face many African countries like South Africa.

I also discussed the importance engaging directly the people impacted by the challenge in a context were diversity of cultures and lived experiences exist. Design thinking brings together people from different disciplines, cultural backgrounds and nationalities to work in multidisciplinary teams.

Keneilwe Munyai
University of Cape Town, South Africa
keneilwe.munyai@uct.ac.za

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Re-thinking archiving for increased diversity

Insights from a co-design project with museum professionals and refugees

Elisabet Nilsson, Sofie Marie Ottsen Hansen

Abstract

The design research project Co-archiving Refugee Documentation is based on a collaboration with museum professionals and refugees. The overall aim of the project is to explore and develop collaborative (co-)archiving practices involving underrepresented voices in generating materials for the public archives and museum collections. The underlying assumption is that inviting more people to contribute to the public archives would result in a more diverse and representative record of human existence.

A co-design process involving museum professionals and refugees resulted in a design concept for increasing the participation in archives referred to as the Co-archiving Toolbox. The toolbox is designed for archivists and museum professionals to use when collecting material in the field. It is meant to be administered by a public institution (a museum or an archive), left in the field for a period of two weeks, and used by the people who are being documented, that is, the 'subjects' of the archive. By applying the archiving practices included in the toolbox, they are invited to document their life situations with limited interference from the institution.

The focus of this paper is on the outcome of the first field test of the co-archiving toolbox. The insights gained serve as input to the next iteration of the concept. The test was conducted at a leisure centre hosted by a non-governmental organisation that organizes on a voluntary basis activities for unaccompanied refugees under 18 years. Seven teenage boys participated in the field test. It turned out that only a few of them contributed with material to the co-archiving toolbox. According to the museum professional who worked with the toolbox, some of the boys even seemed to avoid the box. Her impression was that the barrier to engage was too high. The boys expressed a sense of dejection and wondered who would be interested in hearing their stories anyway. Some archival material was however generated during field test, mainly written material. Seeing the toolbox in the specific context of the leisure centre brought forward a clearer picture of the use of toolbox as very much a situated practice, where the physical placement and the specifics of the field influence the kind of tools applied and the way they are used. Whatever the boys' reasons were for not feeling motivated to contribute to the archive, an important lesson to learn is that the toolbox ought to be carefully adopted and adjusted according to the specific context and user group.

The final iteration of the Co-archiving Toolbox will be designed as a completely open source co-archiving toolbox, where both the physical box in form of files for replicating the build, all materials and the handbook are made available for download, re-production and replication. The open source kit will be distributed via online maker communities. The results of this research project will thus reach beyond the academic community and be made accessible to professionals who are interested in continuing to innovate and create better conditions for increased participation in and access to our common archives.

Theme: Innovation
Keywords: co-archiving, co-design, refugees, museum professionals, archives

1. Introduction

The design research project *Co-archiving Refugee Documentation* presented and reflected upon in this paper is based on a collaboration with museum professionals and refugees. The overall aim of the project is to explore and develop collaborative (co-)archiving practices involving underrepresented voices in generating materials for the public archives and museum collections. The underlying assumption is that inviting more people to contribute to the public archives would result in a more diverse and representative record of human existence (Warren, 2016; Dunbar, 2006).

The project is part of a larger research project called *Living Archives*, which aims to explore archives and archiving practices in a digitized society from various angles. The overall purpose of the project "is to research, analyze and prototype how archives for public cultural heritage can become a significant social resource, creating social change, cultural awareness and collective collaboration pointing towards a shared future of a society" (livingarchives.mah.se, 2018-01-11).

One of the cornerstones of the *Co-archiving Refugee Documentation* project is a statement by Derrida (1995, p. 4): "There is no political power without control of the archive, if not memory. Effective democratisation can always be measured by this essential criterion: the participation in and access to the archive, its constitution, and its interpretation". The consequence of this statement on the field of archiving is an obligation to ensure that all groups are invited to contribute to the archives, and to

achieve this requires the continuous re-thinking and developing of new approaches, methods and practices. The statement raises important questions regarding not only how to involve underrepresented voices in contributing to our archives but also how to support co-archivists who strive to seriously engage their subjects in shaping the archives.

To set the stage of the project, this paper begins by briefly reporting on a co-design process involving museum professionals and refugees, resulting in a concept for increasing the participation in archives referred to as the *Co-archiving Toolbox*. The toolbox includes a set of archiving practices designed to be applied at a temporary refugee housing site but could also be potentially used in other contexts. The main focus of this paper is on the outcome of the first field test, where the toolbox was put into use in a real-world context. The insights gained serve as input to the next iteration of the concept and subsequent field tests. The actual co-design workshops which led to the toolbox concept is presented in more detail in previous and forthcoming writings (see e.g. Nilsson, 2016; Nilsson & Ottsen Hansen, 2016; Nilsson & Barton, 2016).

In addition to the project introduced in the following, two more design projects run by master's students in Interaction Design served as inspiration and contributed to the toolbox concept. One of the projects was part of a course from the master's programme and resulted in a collection of concept ideas: *StoryMap*, *Conversation Archiving*, and *StoryBox*, which are co-archiving practices that allow communities to recall and record their experiences from their own perspectives (*Living Archives*, 2017). The other project was a master's thesis project where a collaborative self-archiving system for vulnerable groups was co-designed and explored (Dimitrova, 2017).

2. Background

2.1. The Refugee Documentation project

As a response to the emergent refugee situation in 2015, when nearly 163,000 people sought asylum in Sweden (The Swedish Migration Agency, 2015), the three largest museums in southern Sweden initiated the *Refugee Documentation project* aimed at documenting the emergent refugee situation in Sweden (Nikolić, 2016). Through their initiative, the museums have up to now documented a wide variety of refugees' stories and experiences of coming to Sweden to seek asylum. They have also collected testi-

monies from the many volunteers and activists who participated in receiving the refugees who arrived in Malmö during the most intense period in autumn 2015. One of the goals of the project is to create a large national touring exhibition based on the material captured, and in conjunction with this, to also organize a series of research conferences. A further goal is to produce a documentary film focusing on the issues of activism.

The methods applied in their documentation work followed well-established practices from the field of ethnology (e.g. participatory observations, interviews, video and audio recordings, and questionnaires). As expressed by their project manager, their work has resulted not only in a rich collection of archival material but also in new research questions dealing with methodological challenges regarding matters of inclusion and representation when documenting crisis situations (Nikolić, 2016). Many of the questions raised deal with the need for new approaches, methods and practices to ensure the increased diversity of our archives, and more specifically, approaches that invite people to directly share their experiences.

2.1 The Co-archiving Refugee Documentation project

Based on the questions that emerged in the *Refugee Documentation Project*, the *Co-archiving Refugee Documentation Project* was established building on a collaboration between the *Living Archives* project and the three museums. The project continues to build on previous design interventions within the co-archiving research theme (see e.g. Nilsson 2016; Nilsson & Barton, 2016; Nilsson & Ottsen Hansen, 2017) as well as insights gained in the *Refugee Documentation Project*.

As mentioned in the introduction, the aim is to design co-archiving practices for inviting refugees to share and document their experiences from their point of view and not through the lens of the Other, that is, those who gather the documentation, interview, filter, select and archive. The target group for these co-archiving practices is not only the unheard – in this case, refugees – but also the archivists and museum professionals who are interested in assuming a co-archiving facilitation approach by engaging the subjects (the documented) in the shaping of archives. To explore this, a co-design process was set up which invited both refugees and museum professionals to take part in re-thinking and developing new ways to document and archive refugee stories – told in their own voices and through their own perspectives.

3. Research process and methods

3.1 Design research

The research approach assumed in this project is design research, which has its roots in action research (Agyris et al. 1985) and is often driven by a critical agenda exploring alternatives in existing cultural settings. Assuming such an approach implies that prototyping and design actions are part of the iterative research process, which often involves real world settings and people (Harvard Maare, 2015). In our project, this was manifested by inviting the stakeholders to be part of a co-design process, which is also one of the central principles of participatory design. Instead of designing *for* the users, the designers and/or researchers work *with* the users in a process of joint decision-making, mutual learning and co-creation (Simonsen et al. 2013). Accordingly, prototyping and design interventions have been part of the research process.

3.2 Research process

3.2.1 Co-design workshops

In total, four co-design workshops were conducted, inviting both refugees and museum professionals to innovate new ways to document and archive refugee stories together.

Three of the workshops were organized in the facilities of the university, and one was organized at a temporary housing facility for refugees. Four museum professionals and four refugees were engaged in the three first workshops, and the last workshop involved eight museum professionals. In total, fifteen participants contributed to the workshops, in addition to two researchers, master's students, and a visiting researcher. On average, the workshops were 3 h long and conducted over the course of 3 1/2 months. All activities were photographed, audio- and videotaped, and field notes were taken.

At the workshops, a selection of generative design tools and techniques were applied, aiming at giving the participants a language with which they could imagine, articulate and express their ideas (Sanders & Stappers, 2012). Building on the outcome of the workshops, a series of concept ideas for co-archiving tools were then developed. The design process finally resulted in a design concept referred to as the *Co-archiving Toolbox*, which consists of seven archiving practices (for more details see section 4). The concept idea was first materialized with a lo-fi card-



Figure 1. Prototypes of the Co-archiving Toolbox made in cardboard and wood.

board prototype, and then with a hi-fi prototype built more robustly so that it could be tested in the field.

3.2.2 The field test

The field test was conducted at a leisure centre hosted by a non-governmental organisation that organizes on a voluntary basis activities for unaccompanied refugees under 18 years. The activities organized at the leisure centre are aimed at supporting this particular group in the integration process, fostering an understanding of cultural and societal codes, and developing language skills, etc. The leisure centre is open three days a week in the afternoon/evening. The majority of the attendees are boys who come to socialize, do their homework and find new friends. Some courses are also offered, e.g. in programming.

Seven teenage boys participated in the field test. They, as well as volunteers working at the leisure centre, were introduced to the toolbox by a museum professional. All of the boys spoke Dari as well as some English and Swedish. The volunteers were introduced, and they could later explain the purpose of the toolbox to others who missed out on the introduction but were still interested in participating. The toolbox was left at the site for two weeks. During this period, the museum professional returned to the site twice to refill the box's contents and to encourage people to contribute with archival material. During the other times, the box was overseen by the volunteers.

3.3. Ethical considerations

The project follows the ethical standards as formulated in Codex rules and guidelines for research in Humanities and Social sciences (The Swedish Research Council, n.d.). In the first part of the project, that is, the co-design workshops, all the participants were informed about the aim of the project and that their participation is based on their own decision. In regard to the workshops, all participants were orally informed about their rights, that their contributions were to be treated anonymously, and that the gathered material would be used for research purposes only. They were also asked to sign a letter of consent, with the exception of the last workshop where the participants gave oral consent to take part in the project.

In the second part of the project, the field test, the participants were orally informed about their rights and that the content generated would be collected by the museum. They gave oral consent to participate in the project. On the lid of the Co-archiving Toolbox, information is available about the aim of the box, what the material is going to be used for, and that participation is done of their own will.

4. The Co-archiving Toolbox

The Co-archiving Toolbox is designed for archivists and museum professionals to use when collecting material in the field. It is meant to be administered by a public institution (a museum or an archive), left in the field for a period of two weeks, and used by the people who are being documented, that is, the 'subjects' of the archive. By applying the archiving practices included in the toolbox, they are invited to document their life situations with limited interference from the institution. The different archiving practices included in the toolbox are designed to be open-ended so that the individuals who are being documented have much freedom in deciding how they want to use the tools, thus enabling them to participate in defining how their stories and everyday lives are captured, recorded and archived.

The toolbox is designed to be self-instructive, but instructions describing the archiving practices are also attached to the box. There is also a handbook included for the co-archivists to use when using the toolbox in the field. When the planned documentation period has come to an end, the toolbox including the generated archival material will be picked up, brought to the archive and/or museum and added to their collections.

How the material will be used, meta-tagged, and stored is up to the institution to decide. It can potentially be used directly at an exhibition or be stored in their archives for future use. The seven co-archiving practices currently included in the toolbox are designed to be applied by refugees, but the overall concept could certainly be adjusted and applied to other contexts as well.

The co-archiving practices are:

1. Letters to Sweden The *Letters to Sweden* practice collects letters written to Sweden as if Sweden were a person. This may also involve audio recordings of the person reading the letter/talking to Sweden. The instructions given to the author are simply to "Write a letter to Sweden and put it in an envelope". The authors may (optionally) mark the letter with an ID number to match with other documents and archival material generated about that individual, which will then be stored in public archives (such as documents from the Swedish Migration Agency).

2. Question Collector The *Question Collector* collects written questions from the refugees. The questions are open and may range from small, trivial, everyday questions to bigger, more meaningful questions about life and the future. The aim is not to answer the questions (and this ought to be carefully communicated) but rather to generate an alternative story about the life situation of the individuals. The instructions given were, "Do you have a question about something? It could be big or small. Write it on a note and put it in the box".

3. Meaningful Numbers This practice encourages the refugees to "hijack" their dossier number (ID number at the Swedish Migration Agency) and use it to build a narrative about themselves. There are no rules – the individuals may associate their lives with the numbers in any way they find meaningful (e.g. special dates, street numbers, sizes). The narrative could be attached to the official documents about the individual being archived as a strategy to show that a human being exists behind the numbers. Instructions given: "Tell your story with your dossier number. Write your number on the paper and write notes about what the numbers mean to you."

4. Two Futures In this practice, the author is asked to describe two possible futures: 1) "Me in Sweden year 2027" and 2) "Me somewhere else in year 2027". The two versions of the future scenarios should be attached to each other. The authors may (optionally) mark the letter with an ID number to match with other documents and archival material. Instructions

given: “What do you see in your future? Describe what your future would look like in 10 years if you stayed in Sweden and if you had not.”

5. Snapshots The participants are asked to take a series of photos of everyday life. A disposable camera is provided to take the pictures, which should then be passed to the next person. Instructions printed on the camera: “Take five pictures of: 1) You, 2) a friend, 3) a meal, 4) a quiet place, and 5) a noisy place, and then pass it on to someone else.”

6. Audio Memory A phone number is provided that the participants can call and record an audio message about anything that they wish to share. The receiver of the message and how it will be used and stored ought to be carefully communicated. Instructions given: “Do you have something you wish to share? Call this number and leave a message.”

7. Moving Images The participants are asked to self-organize documentation sessions and record them with a video camera. Of the participants in the group, a film director is to be recruited and made responsible for the camera as well as for filming. A list of instructions is given to the filmmakers that suggests topics for film scripts such as ‘share a story’, ‘sing a song’, ‘film everyday life’ and ‘have a group discussion’. Only those who have signed the letter of consent form ought to be filmed. Instructions given: “Shoot a movie about life where you live. You decide what the film should be about.”

5. Testing the Co-archiving toolbox in the field

5.1 The outcome

It turned out that only a few of the boys at the leisure centre contributed with material to the co-archiving toolbox. According to the museum professional who worked with the toolbox in the field, some of the boys even seemed to avoid the box. Her impression was that the barrier to engage was too high. The boys expressed a sense of dejection and wondered who would be interested in hearing their stories anyway. This echoes a continuous discussion we have had throughout the co-archiving project of how to balance our understanding of the value of individual contributions to the archive with what the participants find valuable or critical in their current life situations.

The concept of the archive in itself might also be a subject where participants could have different cultural understandings of who participates in them and what power structures lie therein. As also expressed by

the museum professional, there may be confusion around the concept of the museum and suspicion around the expressions "document" and "archive" in terms of being tools for surveillance and control.

However, some archival material was generated. The co-archiving practices that was most used and which seemed to be the most engaging and also probably the easiest to get started with were the archiving practices, *Snapshot* and the *Question Collector*. The practices, *Letters to Sweden* and *Two Futures*, also generated some material. *Meaningful Numbers* and the *Audio Memory* were not used at all. The practice, *Moving Images*, was excluded in the toolbox due to the lack of technical resources.

All written contributions were in Swedish. The instructions included in the toolbox did not say that they were allowed to write in their own language. This was implied, possibly too vaguely, by having all written instructions translated into seven different languages, including the participants' native language, Dari. The *Letters to Sweden* and *Two futures* contributions were written in Swedish but nevertheless consisted of strong and touching testimonies. However, the simple and restricted language of the letters can likely be attributed to the lack of language skills.

Seeing the toolbox in the specific context of the leisure centre brought forward a clearer picture of the use of toolbox as very much a situated practice, where the physical placement and the specifics of the field influence the kind of tools applied and the way they are used. Originally, we envisioned the toolbox would be placed in a space where people lived (temporary refugee housing), so that the tools may be taken home or the box approached at different times of the day. At the leisure centre, the refugees only visit after school for a few hours, and as this happens after school, one might suspect that the tools in the box could be regarded as homework. When one participant was asked why he chose the disposable camera, he explained that it seemed the easiest and fastest to do. Many of the tools are aimed at a more immersive use perhaps over a longer period of time. Moving forward, it is crucial to consider how this practice could be supported or suggested.

Evidently, the boys lacked the motivation to participate due to various reasons. Some of them may have seen the toolbox activities as a burden and as extra duties on top of homework rather than an opportunity to express themselves and be part of writing history by contributing to public archives. Others expressed the disbelief that anyone would be interested in hearing their stories. A volunteer also suggested that the physical, non-digital toolbox made of wood was too old-fashioned and suggested that

we should use some digital devices instead, such as an iPad. Whatever the boys' reasons were for not feeling motivated to contribute to the archive, an important lesson to learn is that the toolbox ought to be carefully adopted and adjusted according to the specific context and user group.

5.2 Iterating the toolbox

The next step of the project is to test the toolbox in two more contexts. The toolbox is currently being tested on another site, but the outcome of that test will not reach to be included in this paper. Based on the insights generated from all of the field tests, a last iteration of the toolbox will be produced.

The handbook for the co-archivist applying the toolbox will also be updated based on the outcome of the field tests. As experienced, given that using the toolbox is a highly situated practice, an emphasis will be put on the importance of adjusting and adopting the toolbox to the situation and the subjects of the archive. It will also be more clearly communicated that they are allowed to write in their own language, which will hopefully lower the barrier for participating. When introducing the toolbox in the field, the co-archivists will also be encouraged to spend time discussing the concept of museums, archives, and the importance of creating conditions for everyone contribute to the archives. It ought to be clarified to those using the toolbox that to document and archive fragments of life situations and experiences of contemporary time is *not* about control and surveillance, but rather that their contributions are crucial if we are to ensure increased diversity in public archives.

6. Future development

To repeat Derrida's (1995) argument, to create conditions for inclusive archiving and increase the access to and participation in the archives, is an essential criterion in a democratic society. This project is ultimately about re-thinking and developing new approaches, methods and practices to document and archive life situations and experiences, and potentially, the writing of the history of our times. Besides being concrete archiving practices that can be put into practical use in the field, the co-archiving concept may also contribute to challenging the role of the archivist. The co-archiving practices developed as part this project can serve as an example of how an archivist may become a co-archivist, by going

from a focus on archival appraisal to co-archival facilitation. As experienced in the *Refugee Documentation Project*, there is a need for new approaches for documenting crisis situations and for inviting unheard voices to directly share their experiences. The hope is that this project may contribute with some input in this challenge and provide an example of how various stakeholders (as in the case of the co-design workshops) can to come together to innovate in order to create a social change.

The final iteration of the *Co-archiving Toolbox* will be designed as a completely open source co-archiving toolbox, where both the physical box in form of files for replicating the build, all materials and the handbook are made available for download, re-production and replication. The open source kit will be distributed via online maker and DIY communities. The results of this research project will thus reach beyond the academic community and be made accessible to professionals who are interested in continuing to innovate and create better conditions for increased participation in and access to our common archives.

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Elisabet Nilsson
Senior lecturer in interaction design,
School of Arts and Communication (K3),
Malmö University, Sweden
elisabet.nilsson@mau.se

Sofie Marie Ottsen Hansen
Adjunct lecturer in interaction design,
School of Arts and Communication (K3),
Malmö University, Sweden
sofie.marie.ottsen.hansen@mau.se

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Design methods and local cultures

Intercultural dialogue to foster different perspectives about the design of connected objects

Margherita Pillan, Yichen Wu

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Design methods and local cultures

Abstract

Nowadays, international cooperation programs support the collaboration between professors and designers educated in different parts of the world, and the global diffusion of design knowledge. In the paper, we report some results of a research developed in a Chinese-Italian collaboration between design researchers; the research focuses on the comparison of design methodologies for education and professional work, aimed at the development of innovative products and, notably of connected objects. The mapping of the contents of education programs, together with the investigation of tools and design approaches actually employed by Chinese young professionals working in the field of innovative product design, produces hints for update and renewal of design methodologies for Interaction Design, and the definition of contents that could conveniently introduced in traditional industrial design courses so to support young designers in facing the challenges posed by the technology based evolution of the profession. The paper reports also some results of an education experience held in China, aimed at investigating the suitability of a tool-based approach to the design of connected products. The research demonstrates the fertility of an investigation about differences between local culture with respect to design approaches, to the purpose of refining education programs and design methodologies for innovation.

Theme: Innovation
Keywords: design, interaction design, design education, intercultural dialogue, design methods

1. Local vs global design cultures for connected objects

The evolutions of design tools and methods respond to the increased complexity of the design issues: the social changes and the technological evolution produce new design questions and increase the complexity of project activities. As a consequence, Design culture produces specialized fields of knowledge, such as Interaction Design, Design for Experience, Service Design. While in the far past the issue of methods in the Design culture was considered a secondary issue with respect to the Design practice (Trabucco, 2015), (Munari,1972), (Gropius, 2004), contemporary Design theories propose a vast set of tools and techniques, so providing

quite a structured framework for Design education and professional activities. “New tools allowed for certain areas of design to be executed by anyone willing to learn how to use them” (Newbery & Farnham, 2013). “Many types of automated tool are used in practice by UX designers. These tools support creative thinking, … – in fact any aspect of the design process will have at least one associated support tool” (Rogers, Sharp & Preece, 2011). “In designing interactive systems, the designer will borrow much from each of these disciplines, including methods to help understand and design for people” (Benyon, Turner & Turner, 2005).

The body of design knowledge that refers to these specialized fields is global in the sense that it is aimed at defining design principles that should ensure users’ and customers’ satisfaction wherever in the world they are applied; furthermore, the industry of technology based products tend to be global and referred to global markets: products such as smart objects, smart phones, smart agents (as an example, Alexa and Amazon Echo), home automation solutions and so on, are designed to be distributed in a global market with none or little efforts of localization. For these reasons, few if none research is dedicated to investigating the role of local design cultures in the definition of design methods and tools apt to design technology-based products.

In this paper, we present some results of the research developed in collaboration by the two authors, a Chinese lecturer and an Italian professor who is working for two important Design universities in their countries, China Academy of Art (CAA) and Politecnico di Milano (POLIMI). The research focuses on Design methods and tools for education and professional practise activities, and it aims to investigate how the education programs at university level should be updated so to meet the new requirements of knowledge for the professional activities of designers in China. The focus is on Industrial Design university programs, and our goal is to provide suitable knowledge to students so that they can manage not only the design of traditional products but also the project of technology-based connected objects or “smart” objects. Furthermore, we consider as the main issue the goal of recognising, valorize, maintain and enhance the specific values and characteristics of the traditional Chinese design approaches, while importing the skills that allow young designers to deal also with the project of technology-based products and solutions.

Indeed, the research goal is much more complex than it would appear and, in time, it unfolded into a branched set of other connected question marks.

In the last decades, China faced a tremendous increase of its production capabilities in several different industrial fields of application and, notably, with respect to material products including features based on electronics technologies. The analysis of market and crowd-funding platforms shows a flourish of new objects exploiting the properties of connectivity with the web, so innovating the way of use of traditional objects or proposing new functionalities. The economical and industrial growth was accompanied by an increase of the demand of professional designers capable to conjugate industrial design skills (such as drawing the physical bodies of new connected objects and make mock-ups) with those that are considered the key activities of the design of interactive products and product/systems. On the other hand, if we make a survey of the existing design literature reporting design principles, methods and tools to design the so called smart or connected products, most references could be framed as western design contributions, being generated in academic or industrial research environments located in Europe and USA, from the pioneering works of Norman (The Design of Everyday Things, 1988), Morgridge (Designing Interactions, 2016), Turner and Benyon (Designing Interactive Systems: People, Activities, Contexts, Technologies, 2005), to Cooper (About Face, 2014) and Saffer (Designing for Interaction, 2006) milestones, to the more recent contributions of Rowland (Designing Connected Products, 2015) et al.

After that, in our research, a first question arose: is the main corpus of Interaction Design knowledge the only and final set of principles and methods apt to manage the design of connected objects? And more: is this corpus, in the whole or parts, apt for education in a Chinese traditional design university? Are the tools and methods included in this corpus suitable for design professional activity in China? What can we learn, of global interest, from the analysis of the tools and methodologies actually employed by professional designers working in China e developing technology-based products?

Another question comes out of the trivial observation that, in the last five years, the characteristics of the connected objects evolved very rapidly and, still, we face a transition phase toward and expected enormous increase of IoT based solutions, but to an uncertain future with respect to the interactive features of the connected products and the modalities of human-machine interaction, including control modalities, that could be based on keyboards, graphical user interfaces, connectivity with application on smartphones, voice inputs, artificial intelligence agents and

more. Due to the fast and not-soon-ending evolution of product paradigms and enabling technical solutions, the question is: which is the set of minimum knowledge that should be transferred to design students so to provide them with the most durable capability to be able to manage their profession in a rapidly evolving industrial context?

In order to deal with these issues, we developed a research aimed at producing critical thinking on existing design approaches for innovation based on a conversation and systematic comparison between the Chinese and Italian perspectives, so offering an uncommon opportunity to confront the Design approaches developed in the western countries with the Chinese culture in the field of Industrial Design.

The research is based on activities such as:

- mapping and comparison of academic Design programs of international education institutions;
- mapping of Interaction Design methodologies and tools from dedicated literature;
- interviews with Italian and Chinese professional designers to investigate design approaches and tools actually employed in professional work;
- interviews with Italian and Chinese "masters" of Design, i.e. designers with emeritus professional and teaching expertise;
- education activities with Chinese students at university level.

The research demonstrates that there are significant differences between the Interaction design theories and the actual practical activities carried on by young professional designers. Furthermore, the interviews and the education activities demonstrate that only part of the tools and methods that are commonly considered as fundamental parts on the design process aimed to the creation of interactive products can be effectively proposed in Chinese academic programs, due to the differences in background education and culture, but also to the intrinsic complexity of some methodologies. On the other hand, the investigation of the real activities carried on by young professional designers working in China to the design of connected objects, produced suggestions and hints about new effective approaches to education and the definition of design tools suitable for product innovation.

In the following of the paper, we will report some of the research activities we performed, and summarize what we learned out of them.

2. From ID to IxD of ID in China Academy of Art

Design as a worldwide professional discipline is developing in several different countries with a fast pace that is worth to monitor and analyse in the whole. For instance, in China, we could count 228 universities have the industrial design discipline until 2016 (Network of Science & Education Evaluation in China, 2016), and the number is still rising. Education programs can be separated into two professional fields, one referring to science and engineering, and another one founded on arts and humanities; in fact, several art-backgrounded educational institutions founded industrial design department since the last decade of 20th century. Our investigation focuses on China Academy of Art (CAA) as a research case, due to academic and education cooperation with us. CAA was founded in 1928, it is a renowned university of fine art all over the world, beginning with fine arts, and developing a reputation for design these years, after introducing discipline related to design in 1986. With the results of the Chinese universities discipline evaluation by Chinese Ministry of Education in 2017, CAA got A+ as the first rank of design discipline with Tsinghua University.

The industrial design curriculum of CAA was founded in 1990, when the industrial design was in some way novelty in China education under the urgency of new professional needs, and with little background on local design theories. “It is the urgent need to building industrial design for the new discipline construction of our university and also for the market of China at that time, so how to found it immediately is the top priority...” said by prof. Yang Zhao, the founder and former head of industrial design department in CAA. The concept of industrial design was defined on the 11th annual meeting of China Association of Industrial Design in 1980, the definition of industrial design was newly revised to mean: it relates to mass-produced products, give new quality and qualifications to materials, structure, morphology colour, surface finishing and decoration by training, technical knowledge, experience and visual experience. “Industrial design education and industrial design industry were almost developed simultaneously that time in China, the Bauhaus Academy, founded in 1919, is considered the forerunner of modern design education” (Du, 2010), by the overseas study of the first generation Chinses industrial design experts, Germany was the first country to learn, with these background, CAA adopted traditional German industrial design methodologies and curriculums, learning from western industrial design system, and developing a successful local interpretation of it. However, in the

first decade of its activity, design education in CAA still focused on the form and shape of the products emphasizing the aesthetics point of view, as the core and strength from their traditional aesthetic education, this phenomenon also reflect the design educational situation in that period,

> "In the late 1970s, though influenced by the international industrial design trend, the recognition of industrial design in China only stayed on the concept of art... In the education program for art major promulgated by the Ministry of Education in 1979, this discipline named "industrial art design"... In 1987, by the revision of the promulgation of the "general university social science undergraduate directory", the industrial design named industrial moulding design ..." (He, 2010)

From 2002, the industrial design department of CAA started to think about the local culture as a value for product design and, with the foundation of a design school by CAA, "Design of Orientalism" became one of the major education and research theme, for each design department.

In time, between changes and evolutions, a key changing step of the industrial design department is the introduction of interaction design studios, from traditional product design to exploration of interactive product design, and from aesthetics of material forms of objects to user experience design. This evolution is oriented to global markets, to the exploitation of traditional Chinese local culture in industrial design, and a challenge concerning a suitable education of students so to make them capable of designing both traditional and interactive products, to produce innovation in forms, functions and user experience.

3. Design principles, methods and tools: toward a suitable innovation of education contents

3.1 Framing differences in international cooperation contexts

Referencing In the last decades, international exchange programs for students and teachers have been vastly encouraged and supported, so producing countless opportunities for knowledge sharing and collaborations, mutual learning and the creation of main streams of shared knowledge, toward the construction of a global community with no boundaries.

In this context, Interaction design (IxD) is a new design discipline if compared to industrial design. The core knowledge of IxD, as it is shared in scientific dedicated production, has its main roots in western countries, and was fueled by Silicon Valley industries and research centres such as MIT. The investigation of education programs in China shows that Chinese designers and design educators learned very much about interaction design, user experience design, and HCI from western countries researchers and experts we mentioned before, such as Alan Cooper, Donald Norman, Bill Moggridge, Bill Buxton, and others. However, this doesn't mean that the knowledge learned from the western countries is simply and straightforwardly applied in Chinese academic teaching and in in the exertion of the designer's profession. Actually, when a professor coming from a European university or an American one has a teaching experience in China, a number of factors contribute to making this activity very special and different from one performed in a domestic institution: cultural background, language barriers (were often English is not the mother language for neither students nor teachers; still it is employed as a common language), different metaphors, and other more ineffable differences, influence the whole didactical process, creating problems but also inspiring situations stimulating creativity and dismantling old mental frames. As an instance, the basic concepts of "design tools" and "design methods" cannot be given as granted, since some of the terminologies and the related distinctions are defined in Chinese in a different way, and should be redefined when dealing in a multicultural environment involving Chinese designers or students, especially with the designers with art background. In IxD and service design, we call as tools some conceptual apparatus as Alan Cooper's Personas, while "tools" in common Chinese language is to be thought as a tangible instrument, such as a computer, pen, screwdrivers, not including sketching, persona, scenario, etc. which basic in design context. Language differences make friction in theoretical conversation about design, introducing involuntary misunderstandings even when all the conversers share a common language. More critical, in our experience, is the understanding of some terminologies such as "ethnography" and "empathy", which are in design referred to fields of knowledge, to design methodologies and activities, and to approaches to design for innovation. "Empathy supports the design process as design considerations move from rational and practical issues to personal experiences and private contexts" (Kouprie & Visser, 2009). These terms either are not familiar to some Chinese students of design,

or they can be interpreted in a very different way from context to context, one reason could be the development of Chinese industrial design,

> "(About Chinese design) most colleges and universities focus on the basic skills, techniques and knowledge, but have a serious lack of courses for methodology, and it consists of two parts: one is knowledge and accomplishment, such as craft technology knowledge, mechanics principles, ergonomics, aesthetics, the history of design, etc.; the other is the basis and skills of model, such as the three-dimensional composition, CAD, renderings and so on" (Liu, 2011).

On the other hand, some abilities and skills, such as drawing, prototyping, collecting data about users' behaviours and so on, have an intrinsic objective force and pertain both to the western and to the eastern industrial design tradition.

At the same time, we believe that there is a gap, in both western and eastern contexts, between the ideal design methodologies, tools and approaches aimed at innovation as they are taught in universities, and the real activities performed by professional designers in little and large companies. As an instance, in our design activities in collaboration with companies and industries in IxD projects, the time and resources dedicated to preliminary user studies, ethnography and research in the field are very often limited and scarce.

So, in the definition of the contents that should be provided to young design students in China Academy of Art, we found ourselves in the middle of a triangular gap in which extract the set of suitable practical and conceptual knowledge: theoretical IxD expertise (with it principles, methods and tools), Chinese traditional industrial design (based on thousand years of Chinese art & craft and on the Bauhaus teachings), and modern era professional praxis as it is developed in the China industry system by young designers of innovative products.

3.2 Investigating the current design approaches adopted by young Chinese professional designers working in the field of innovation

One activity we carried out in our research included interviews with professional young designers working in the field of innovative product design and, notably on the design of connected objects.

We report here some of the collected information and some comments.

In figure 1 we report the number of questionnaires we delivered and the main activity of the interviewed subjects. We surveyed 42 designers from 6 kinds of companies, designers involved in this research work for little start-ups as well as in huge economical giants such as Alibaba. Based on one finished project of these diverse designers, we raised the questions about:

- The approaches they used for user research;
- The main design tools for the project;
- The main methods for the project.

During the questionnaire, we could verify an inhomogeneous employ of terminologies to indicate design activities and, notably, an uneven interpretation of "ethnography" as an activity to accompany and prepare the innovative design. From figure 2 we can see that relatively little resources are dedicated to it, as it emerged from interviews, only major Internet companies use "ethnography" and participatory action. Meanwhile, the major Internet companies prefer to use diverse methods to conduct design. We also can find other information that the case study, data collection and analysis are the most popular methods among these companies. What's more, from our investigation it emerged that a very common approach in the design of innovative products is to take experiments which

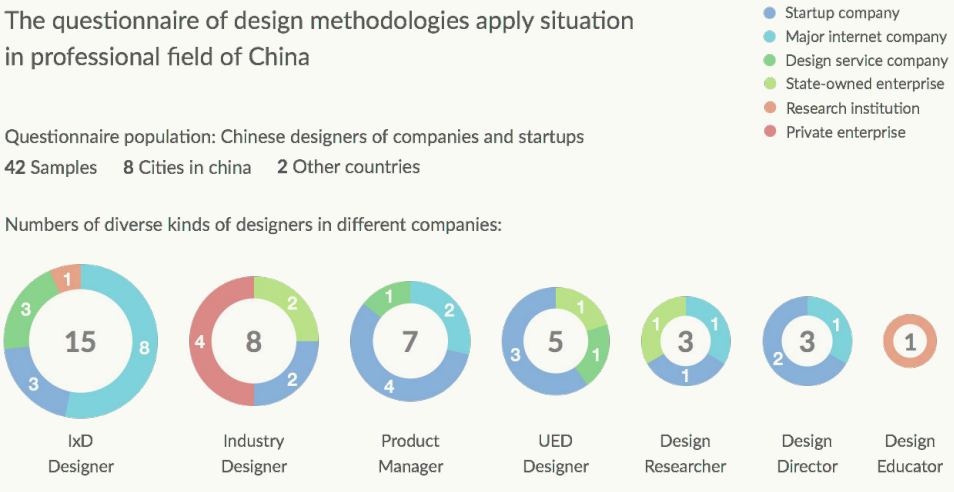


Figure 1. The brief instruction of the questionnaire activity

based on developing concepts (rendering) and physical working prototypes to perform evaluation tests and studies directly with final users employing the prototypes or, at least, expressing opinions on rendering, thus to collect the feedbacks and comments.

From figure 3, we can observe that the collection of online feedbacks, as an instance through the publishing of new concepts on crowdfunding platforms, is the most popular way to collect data about users' needs, attitudes and preferences providing necessary design hints for product innovation. Further preferred sources are the industrial reports and databases. Only start-ups declare to use social media for the survey as preliminary design research to investigate the initial user needs, and these start-ups are using the most kinds of approaches compare to other companies. Design companies and State-owned enterprises use feedback collection by industrial report reviews. Most companies have the database and use statistics to extract design hints.

From the question of the steps they most focused on (Figure 4), the Internet companies have A/B test to be confronted and, for start-ups, while every design phase is considered as important, prototyping and testing is the most important one. Furthermore, private enterprises and design companies focus on same phases and, with the due distinctions, they adopt the same tools.

About the survey of tools in the design process (Figure 5), similar to the phases (Figure 4), start-ups using the most tools including persona which is not as popular as we thought in other companies before we collect the questionnaire results. And user journey is the most popular tool among these companies as well as 3D modelling.

3.3 Experimenting tools and methods in Chinese education

To investigate the situation of design methodology application in Chinese design education, we conducted a design course in the industrial design department of China Academy of Art as a teaching experiment. We expected for the sparks by the collision between art and technology, Chinese and Italian design methodology in education, as well as the results of using diverse methods and tools in the design of connected objects. The theme of the course was "the dialoguing product", i.e. to design a simple connected object and to make it interactive by implanting electronics in a mature technology as a common product used in our daily life, so to make it good for new functions and experience. The students

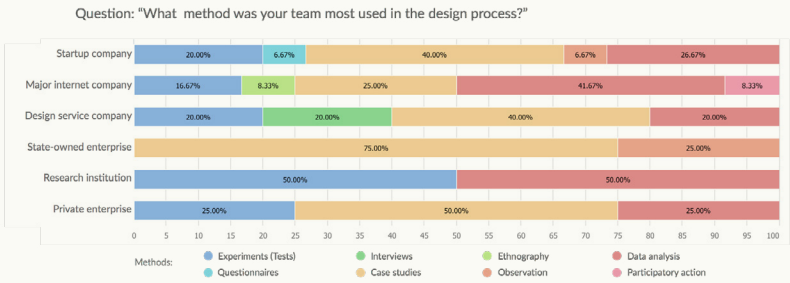


Figure 2. The methods employed by different types of companies in China

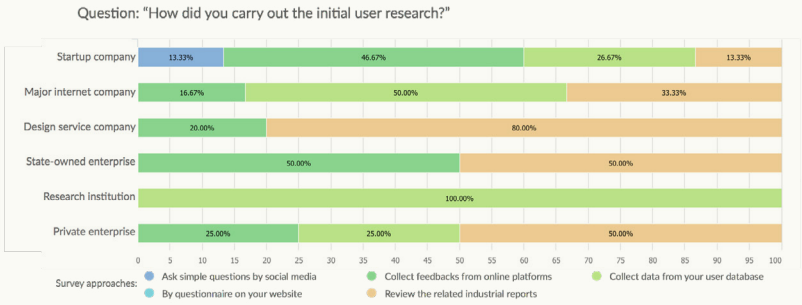


Figure 3. The methods to take user surveys adopted by diverse companies

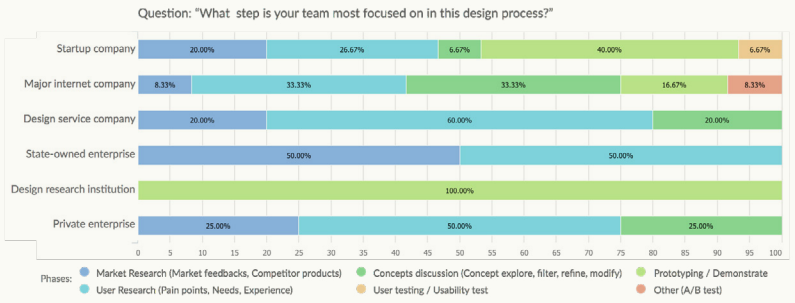


Figure 4. The design phase that is focused on mostly in these diverse companies

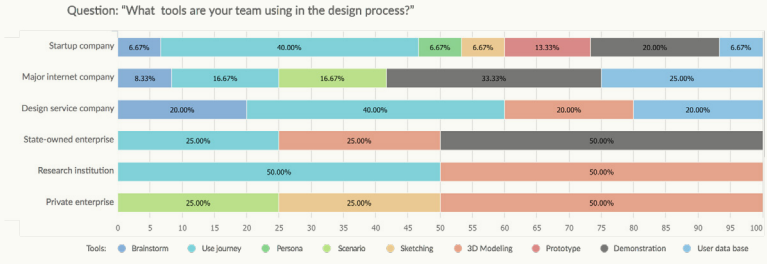


Figure 5. The design tools that applied to diverse companies

were mostly from the last year of a Bachelor program of design, with very good skills in drawings, but no experience in IxD methodologies. We collaborated in the preparation of the course as a complete design process, and we discussed the use of diverse design methods and tools so to verify that we could obtain good education results with students of traditional industrial design background.

Before the course, we surveyed the curriculum of industrial design department in CAA, to analyse the skills of the students (Figure 6) and the tools they had learned and applied (Figure 7) in both industrial design and interaction design; furthermore, we compared the literature methods and tools in UCD and the current situation of CAA (Figure 8). From the comparisons, we can observe that there are similar courses for the training on the design skills at design performance, technology and practice, while, at the phase of professional training, there are differences. About the tools, the maps show that students had the experience of using common tools, such as sketching, persona, scenario and so on.

In the course, we used case studies to make the students frame connected objects and their specific features including not just physical description, but also their properties connected to connectivity and interactivity; the preliminary research phase was useful, and we could find that they can analyse case studies (Figure 9). At the beginning of the design phase, by the experience of the author form CAA, we forced students to produce a creative brief (the tool was new to them) to avoid stu-

	Industrial Design	Interaction Design
Design & Performance	Mechanical drawing / The product dimension understanding Hand drawing / Sketching 2D fast expression / 3D modeling / Rendering	Mechanical drawing / The product dimension understanding Hand drawing / Sketching 2D fast expression / 3D modeling / Rendering
Design & Technology	Material characteristics / Connection Type / Processing craft **Transmission structure** / Mechanical drive system re-application	Material characteristics / Connection Type / Processing craft Mechanical structure / Mechanical drive system
Design & Theory / method / practice	Overall view of industrial design Design genre / Understand classic designs Basic dimensions of human / Dimensions of human actions User psychology knowledge for design Basic consumer psychology knowledge Understand the role of designers / Basic theories System of product / System of products and external conditions	Overall view of industrial design Design genre / Understand classic designs Basic dimensions of human / Dimensions of human actions User psychology knowledge for design Basic consumer psychology knowledge Understand the role of designers / Basic theories System of product / System of products and external conditions
Design & Professional	Product construction and assembly Semantics for product design with culture New material experiment Basic brand and products design theory Life scenario create / Requirement analysis Customer study / Mockup Business strategy	**The concept / principle / method of service design** **APP structures / GUI design / Prototyping** **The concept / principle / design method of information product design** **Technology application design / Scenario create** **Scenario create / User study** **Web and Mweb prototyping / Programming** **Kansei value analysis / Emotional design**

Figure 6. Students skills of Industrial design and Interaction design in industrial design department of CAA

Used tools of Industrial design and Interaction design in industrial design department of CAA

	Industrial Design	Interaction Design
Design & Performance	Mechanical drawing Sketching 3D modeling / Rendering	Mechanical drawing Sketching 3D modeling / Rendering
Design & Technology	Study models 3D Printing	Study models Prototyping
Design & Theory / method / practice	Literature reading Case study	Literature reading Case study Behavior observation
Design & Professional	Interviews / Brainstorm / Prototyping / Sketching / Persona / Co-creation Questionnaire / Experience maps / User journey / Storyboard / Process diagrams Consumer journey / Role Playing	Interviews / Brainstorm / Prototyping / Sketching / Persona / Scenario Questionnaire / Experience maps / User journey / Storyboard Consumer journey / Mood board / Video demo

Figure 7. Used tools of Industrial design and Interaction design in industrial design department of CAA

Typical UCD process	methods and tools used in a typical UCD process	Actual using in CAA (● In use ○ Not use)
1. Investigate		
Vision, goals, objectives		
Identify challenges and constraints		
Exist Solutions study	Case study	●
Image	Mood board	●
User/Audience analysis	User Categories Matrix	○
	Personas	●
	Focus groups	○
	Questionnaires	●
	Expert interviews	○
	Group interviews	●
	Individual interviews	●
	In-Context immersion	○
Task/Purpose analysis	Task List	●
	User-Task Matrix	○
Technology analysis	Case study	●
	Function testing	●
	Literature reading	○
User journey analysis	User journey	○
	Scenarios	●
2. Design	Brief	○
	Card Sorting	○
	Brain storming	●
	Conceptual/Mental model	●
	Storyboards, wireframes	●
	Paper prototypes	●
	Shape mockups	●
	Functional prototypes	○
	Participatory/Co-Design	○
	Empathic design	○
3. Evaluation & Test	Guidelines reviews	○
	Usability testing	●
	Interviews	○
	Questionnaires	●
4. Production		

Figure 8. The application situation of methods and tools in CAA of UCD

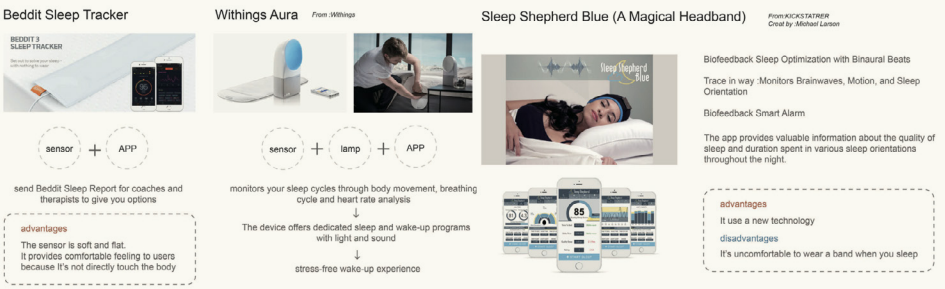


Figure 9. Case study of project "Sleep monitoring"

dents changing their design proposals thus affect efficiency; the brief had to focus mostly on functional features and services, and its use got a positive result for the students, "It made us work out such a great product in two weeks, usually we should spend four weeks to make a project to this" was said by one of the students from "Sleep monitoring" team. We also asked them to produce storyboards to describe the interactive and dynamic features of products and the visual representation of activities and procedures since the very first design phases; this approach was very effective (also due to the students' ability in drawing) and we found it suitable for the art backgrounded students, as they created the storyboard to express the use of connected objects vividly (Figure 10, 11) in one day. Through the construction of the storytelling, the positive and critical issues related to the interactive features of the products could emerge clearly and this helped students in refining and revising the functions and physical characteristics of their concepts. The tool we applied for their final expression of the design was the video scenario; this tool can be employed both for final presentation of products and for preliminary concept evaluation (Pillan, 2014; Pillan, 2014). The CAA students had experiences in the design of video-storytelling, but hadn't used it as a design tool. As a result of their art education, the presentations produced in this phase showed the diversity of the students' minds because of their artistic accomplishments, as they adopted different styles and representation techniques, including not only in real person actions but also different cartoon styles, such as stop-motion animation and low polygon animation (Figure 12).

What's more, during the course, we found there is an observable difference in the capabilities of students to keep under control the technical feasibility of the connected objects they design. For the students of

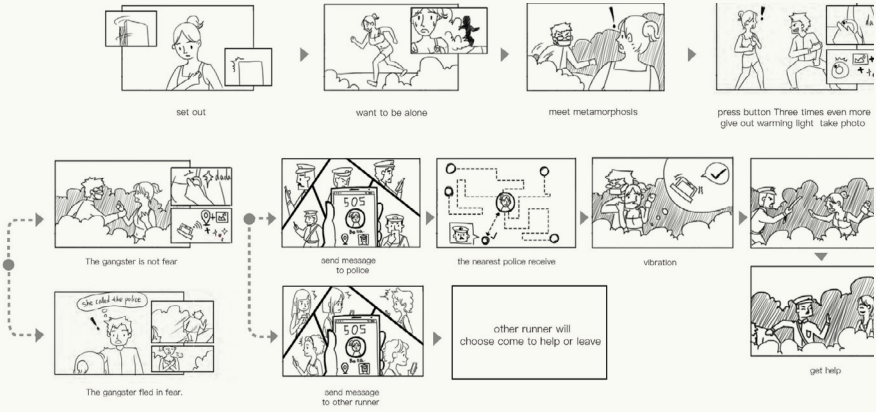


Figure 10. Storyboard (part) of project "IRIGO"

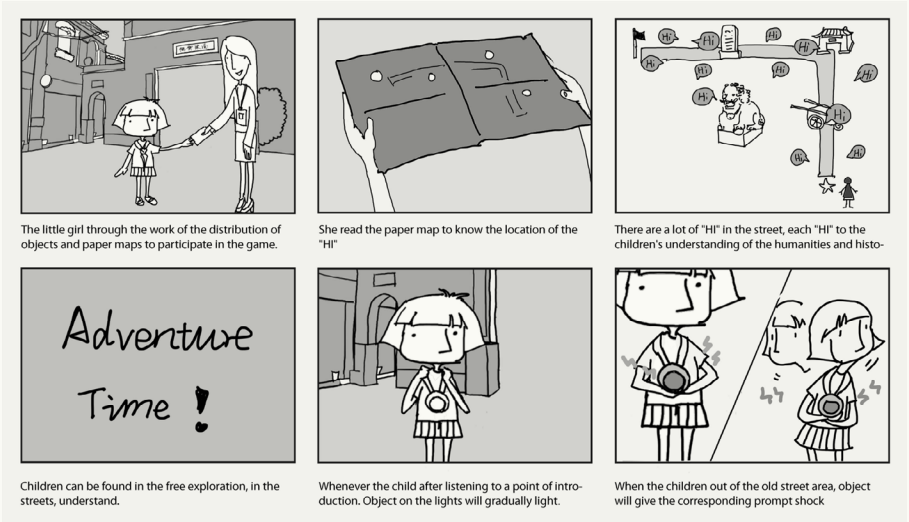


Figure 11. Storyboard (part) of project "Streexplore"



Figure 12. Video scenarios in low polygon animation and stop-motion animation

CAA, we found that most of them prefer to do the technology investigate through the analysis of existing products, to get hints about the technical solutions from other existing products or form the same typology of products by collection of case studies. The comparison between this approach with the one adopted in Design& Engineering design courses at Politecnico di Milano, demonstrated that the students of this institution preferred instead using literature readings (including reference to papers and to technical documents issued by technology oriented companies) and a direct study of the new technologies to be inspired in the design of innovative solutions, or even the research about future possibilities of further technologies so to get inspiration about disruptive proposals. In this way, Italian students seems to frame their role with respect to technology as trailblazers and scouts or, even, as inspirers of technology evolutions; furthermore, maybe due to specific scholar backgrounds, the Italians seems to be willing of adopting a scientific approach to the use of technologies, deepening the investigation of cause and effects and discussing the reliability of technical sources of knowledge. The students of CAA, instead, refer to mature technologies. This different attitude toward technologies affects the creative results, since, as it emerged from our analysis, the contribution of innovation brought by Italian students' concepts seems more consistent. On the other hand, the students of CAA could make a design concept into a real product in more shooter time and their very strong skills in drawing also allowed them to be very effective in the creation of good video-scenarios and prototypes to be tested.

The research we are performing is not based on a statistical base of data, but was effective in revealing phenomena and producing hints for further investigation.

With respect to the production of knowledge about education, we could say that, in our research, art backgrounded students show a more emotional approach to the study of specific solutions and maintain the focus both on functions and physical forms; in confront, the students with Design & Engineering thinking will use a more rational way to prove the suitability of their concepts, and, in most case, delay the focus on shape to the ending phases of the project but still have possibilities to produce emotions into their design.

4. Conclusions

Through our discussion and the experiments, we demonstrate that the mapping of the education contents that are provided by the design schools in different countries, together with the comparison of the results of these approaches, provide food for thinking about the contents of education programs. As our final goal is the definition of programs to provide young designers the required skills and theoretical knowledge capable to support them in their profession, the analysis of education approach must be accompanied to the investigation of real professional activities.

With respect to the definition of programs for the students of CAA, we can summarize here some of our findings.

- The creation of international design experiences with teaching provided by western designers and researchers is very valuable for Chinese students, so to make them learning the design methods and tools that have mainly developed by western countries. Meanwhile, by the fast development of China, we also can learn much about the design methods and tools from the Chinese companies in new field, such as Alibaba, which is a major company of the Internet business;
- With respect to different culture and discipline backgrounds, rational and emotional thinking could rely efficiently on specific tools, for instance, to verify technology feasibility and also to exploit technology in innovation. The literature reading is an effective method to learn from science and technology research more than referring to existing products. While the case study analysis is a key activity in design, it is reductive to rely only on case-study research when aimed at innovation.
- With respect to the design expression abilities that are the traditional main contents of art-oriented courses, as in CAA, these abilities show to be very useful also with respect to the design of innovative products since sketching, visually describe user journeys, producing convincing storyboards, and so on, that are a straightforward activity for art students, provide the suitable tools for the interaction design. The ability of producing in very short times 3d drawings and physical prototypes, support an approach based on A–B concepts and tests, that seems to be very convenient in the design profession in China.

- The capability to manage time issues, and to reliably plan time-schedule and intermediate deliveries is a very important characteristic of designers and is not naturally included in the skills of art students. The introduction of design tools such as the creative brief, describing the main features of the object to be designed, its main functional characteristics and innovation values, was quite effective, in our experiment, in making the students understand time and efficiency issues and to indicate possible practical solutions.
- By our research, the IxD tools and methods that are applied in Chinese companies are much more than those taught in CAA; this phenomenon also inspired us to concern the diverse methods and tools suitable situation for the students and to begin the definition of theoretical requirements for education about the design of connected objects. Therefore, it is our future work to explore the possibilities of more methods and tools to be employed in design courses

A further development of our research will focus on the how to better foster the Chinese art tradition in the design for innovation.

Margherita Pillan
PhD associate professor in design,
Politecnico di Milano, Department of Design, Italy
margherita.pillan@polimi.it

Yichen Wu
PhD applicant at the Dipartimento del Design,
Politecnico di Milano, Italy
lecturer at the Industrial Design Department,
China Academy of Art in Hangzhou

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Why Nurturing Student Mindsets and Skillsets is Critical to The Future of Design Education

A Manifesto

Gary Pritchard

Abstract

This paper documents the ambitions and outcomes of an investigation to develop a radical manifesto for the future of creative design and media higher education. The result was the development of five fundamental principles that underpin a manifesto (Mindsets and Skillsets) that sought to profoundly redefine how creative design and media education could be delivered in the UK. At its heart – the manifesto attempts to create the optimum environment for students to thrive in education, careers and through life.

Ravensbourne University began a review of its portfolio of courses and academic delivery in May 2016. This provided a unique opportunity to evaluate the existing programme delivery philosophy along with the practices and models of a range of international creative educational contexts, and to review relevant literature and practice. Using a combination of the 'Double Diamond' design-thinking approach and a 'grounded theory light' research methodology this study gathered data from international college visits, pedagogic conferences, literature reviews around student learning, delivery modes and learning spaces, and a hosted symposium anchored by an international educational panel and a creative industries professional panel. The five resulting principles emerged from the analysis of the data materials and were identified as:

Principle 01: Cultivate / where the whole person thrives
Extending the student experience as holistic education – beyond the discipline and embedding into the core curriculum life skills such as resilience, self-efficacy, and multiple intelligences

Principle 02: Collaborate / where disciplines evolve
Blurring rapidly dysfunctional discreet disciplines to nurture a transdisciplinary petri dish approach for new thinking and practice. With the intention to foster shape-shifter practitioner graduates responding to, and leading on new practice demands.

Principle 03: Integrate / where education engages industry
Inculcating new professional modes of learning where education mirrors industry practices as 'production house' or 'design studio' to integrate both depth and breadth – inspiring specialist and generalist identities

Principle 04: Advocate / where purpose informs practice
To encourage 'Citizen Practitioners', moving from personal passion to tackling real-world problems. To evolve the 'self to selves'; from

the individual to the collective in order to imagine and realize purposeful creative outputs and solutions.

Principle 05: Originate / where creativity harnesses technology To provoke radical 'mindsets and skillsets' that meld the dynamism of ideas and technology towards applied mastery – leveraging theory practice and innovation.

The paper attempts to position The Mindsets and Skillsets Manifesto as a visionary, pragmatic and deliverable new model of creative higher education.

Theme: Innovation
Keywords: interdisciplinarity, transdisciplinarity, pedagogy, thriving, collaborating

1. Introduction

1.1 Rationale for Change

Ravensbourne University, based on the Greenwich Peninsula in London UK, began a review of its portfolio of courses and academic delivery in May 2016. The review coincided with the appointment of two new Deans to lead the Schools of Media and Design. This provided a unique opportunity to evaluate the existing college philosophy along with the practices and models of a range of international creative educational contexts, and to review relevant literature and practice.

The rationale for evolving and realizing a strong and distinct higher education (HE) proposition was not simply cosmetic; Brexit has introduced a previously unforeseen mix of challenges and threats to European HE. The GuildHE Brexit Update 2 (20th January 2017) predicted the following challenges to Higher Education Institutions (HEIs): staff retention, research funding, student recruitment, collaborations, student loans, ability to plan, and xenophobia. The report cited opportunities as: new partnerships, focus on HE for UK growth, favorable exchange rate, International refocus and growing talent.

There were additional factors that were requiring a change culture at this institution and these included; the institution's move towards university status with the application for Teaching Degree Awarding Powers (TDAP), the UK Government's Teaching Excellence Framework (TEF), Tier 4 Visas and the attempt to tighten control of and potentially reduce over-

seas (Tier 4) student numbers, research funding challenges, the proportions of Further Education (FE) and Higher Education (HE) student numbers at the institution, the role of apprenticeships, school education reform and the decline of arts-based subjects in primary education.

It was also felt that creative design and media education is due a major review; the traditional subject lecture, seminar, tutorial model has barely changed in 40 years. In light of the above, this change project sought to position this institution as a dynamic and agile player in the HE creative education sector within the London context and both nationally and internationally.

1.2 Scope, Scale and Methodology

This study utilized a mix of methodological approaches in order to accommodate the wide range of data gathered. In the first instance the researchers employed a 'grounded theory-light' methodology to interrogate the range of materials and contexts. These materials included data from international college visits, pedagogic conferences, literature reviews around student learning, delivery modes and learning spaces, and a 'Futures in the Making' symposium. The symposium also included presentations by each course at the university and data collected via a course questionnaire, market intelligence data, a range of workshops and the central external inputs anchored by two panels; one comprising of international educators and academics and the other panel of creative industries experts and practitioners.

Extensive field notes were also created by the authors to provide another level of rich data. Analysis occurred during and after each round of data collection. Field notes were cross-referenced through each stage of data analysis to achieve a more complete understanding of the data being investigated. Corbin and Strauss (1990) describe the three fundamental elements of a grounded theory approach as concepts, categories, and propositions. This construct provided a useful analytical framework to evolve a cohesive range of outcomes from the study.

Once the data had been organized and categorized, the research then employed the 'Double Diamond' design-thinking methodology as the basis to progress the study into process with a coherent set of outcomes and recommendations. Divided into four distinct phases – *Discover, Define, Develop* and *Deliver* – the Double Diamond is a simple visual map of the design process. In all creative processes a number of possible ideas are

created ('divergent thinking') before refining and narrowing down to the best idea ('convergent thinking'), and this can be represented by a diamond shape. The Double Diamond indicates that this happens twice – once to identify the problem and once to create the solution. Discovering the best ideas in the creative process is iterative – ideas are developed, tested and refined. In *Discover* designers look at the problem in new ways, discover new things and gather new insights. In *Define* designers try to make sense of the possibilities identified in *Discover*. *Develop* is the part of the process where concepts and potential solutions are created, prototyped, tested and iterated. In *Delivery* the solution is finalized, produced and launched.

Through the Design Double Diamond creative process the resulting *Mindsets and Skillsets Manifesto*, with the underlying *Five Principles*, was designed and written forming the basis of the re-launch of the curriculum structure, content and delivery modes.

1.3 Literature Review

The initial data gathering and analysis for this study included a literature review around themes that were deemed pertinent to the context of Ravensbourne: student learning, multidisciplinary approaches to subject pedagogy, and innovative educational delivery models. This led to the evolution of the *'Five Principles'* of the *Mindsets and Skillsets Manifesto* and has subsequently led to further more focused distillation of these themes around inter and trans-disciplinary approaches to portfolio delivery; student thriving; purposeful design and media practice; technology and creativity. The following is a summary of the literature review that informed the *Mindsets and Skillsets Manifesto*:

1.4 Student Thriving

A key driver in this project was to ensure that student experience was at its heart. Student success can be defined broadly as 'satisfaction, persistence, and high levels of learning and personal development.' (Kuh et al., 2005, p. 14). However, while such indicators tend to focus on academic performance and graduation rates, a successful university experience must reach beyond such criteria.

The concept of 'thriving' as utilized by Schreiner (2010a) is useful in her examination of what it takes to create a holistic university student

experience. There are three main types of thriving according to Schreiner (2010a): academic thriving, intrapersonal thriving, and Interpersonal thriving. *Academic thriving* is characterized by engaged learning and academic determination. Students who are thriving academically are psychologically engaged in the learning process, not merely engaged in behaviors. The learning process energizes them. *Intrapersonal thriving* requires the development of healthy attitudes toward the self as well as toward the learning process. Lastly, *interpersonal thriving* includes meaningful connections with other people.

Schreiner's (2010a) validated and reliable 35-item 'Thriving Quotient' has been administered to over 15,000 college students across more than 70 institutions in the USA and Canada. The goal was to measure aspects of college students' psychological functioning that were amenable to change, so that interventions could be designed to enable a higher percentage of students to get the most out of their college experience. The research shows that thriving is a distinct construct comprised of the following: The idea of thriving was conceptualized as optimal functioning in five key domains: (1) Engaged Learning, (2) Academic Determination, (3) Social Connectedness, (4) Diverse Citizenship, and (5) Positive Perspective.

Engaged Learning occurs when students are meaningfully processing the material, making connections between what they already know or are interested in and what needs to be learned (Schreiner 2010b). They are focused and attentive to new learning opportunities and actively think about and discuss with others what they are learning. In short, they are energized by the learning process. The second of the key domains, *Academic Determination*, is necessary to academic thriving (Schreiner 2010b). Here it is not just about the motivation to engage in learning, but is also about the behaviors and attitudes that enable students to push through challenging times and persist in reaching their academic goals. *Academic Determination* is characterized by an investment of effort, an ability to manage one's time and the multiple academic and personal demands of the college environment, a motivation to succeed, the intentional pursuit of one's goals, and normalizing the help-seeking process. *Social Connectedness* can be distilled into the following: healthy relationships, nurturing a sense of belonging, encouraging positive interactions with others, cultivating students' voices and contribution, working together toward common goals, and an openness to diversity.

Diverse Citizenship consists of encouragement of students to engage in specific activities that will enhance their diverse citizenship, and a

structuring of campus events and activities to promote interactional diversity. When the institution sends a strong signal that honoring differences is a key value of the institution, the foundation is set for positive interactional diversity – conversations in and out of class around politics, world events, differing religious views, cultural differences, and divergent world views. It is not simply the interaction with difference that matters; it is also the quality of that interaction. Lastly, *Positive Perspective* consists of equipping students with an optimistic explanatory style, and helping students envision their future success. (Schreiner 2010a).

How students explain the setbacks and failures that are an inevitable part of life affects their likelihood of recovering more quickly from such events, as well as an ability to approach future challenges. When students have a positive perspective on life, what psychologists call an 'optimistic explanatory style', rather than an unrealistically positive view of the world, this perspective actually enables a person to come to grips with difficult situations more readily. The coping strategies that distinguish this optimistic explanatory style can be characterized as proactive and problem-focused, rather than reactive and avoidant.

Another strand of the thriving literature refers to so-called strengths-based education (Anderson, 2005; Austin, 2005; Cave, 2003; Cantwell, 2005; Gillum, 2005; Epstein, Pritchard, 2006; Pritchard & Pritchard 2008; Rudolph & Epstein, 2000). A strengths-based approach to education can be defined as the identification and development of the unique individual strengths and talents of each student. Anderson describes this approach as supporting students as they 'apply their strengths and talents in the process of learning, intellectual development, and academic achievement to levels of personal excellence' (2004, p.1). Strengths-based approaches attempt to help students identify their own unique talents and then use them to develop a strategy for utilizing such gifts in negotiating their academic progression and careers. As Anderson and Schreiner (2004) state, 'Research ... has led to a potentially revolutionary discovery: individuals who focus on their weaknesses and remediate them are only able to achieve 'average' performance at best; they are able to gain far more – and even to reach levels of excellence – when they expend comparable effort to build on their talents. This discovery is of enormous import to higher education...' (p. 4). A strengths approach encourages students to develop into individuals capable of capitalizing on their gifts and abilities in various contexts. In identifying and cultivating students' strengths, it seeks to encourage self-awareness that also nurtures a confidence to

then apply those strengths to their academic studies. Anderson (2004) suggests that, 'a strengths-based approach to teaching involves a process of assessing, teaching and designing experiential learning activities to help students identify, develop and apply their strengths and talents in the process of learning, intellectual development, and academic achievements to levels of personal excellence' (p.1). It could be argued that applying a combination of both the thriving and strengths based approaches has much to offer in nurturing student academic success.

1.5 Multidisciplinary, Transdisciplinary, and Interdisciplinary

As subject disciplines within creative approaches begin to overlap or even blur in their distinctiveness (E.G. digital/analogue, film/digital effects), this study sought to explore pedagogic models that could exploit the potential of intentionally facilitating cross-disciplinary methodologies. For the purposes of this summary, definitions of multidisciplinary, transdisciplinary, and interdisciplinary models will be defined as the following: a multidisciplinary model occurs when disciplinary scholars collaborate while remaining within their respective disciplinary frameworks. In this framework research tackles issues from several disciplines, however the subjects are taught in parallel to each other rather than integrated together (Harris, Lyon, Clarke 2009). This paper, while acknowledging this method as valid, will primarily focus on transdisciplinary and interdisciplinary models. An interdisciplinary model integrates subject knowledge with working methods from a range of disciplines to create a synthesis of practice. It integrates ideas from different disciplines and sits in the space between existing disciplinary knowledge and original research approaches. (Harris, Lyon, Clarke 2009; Learning Teaching Scotland 2010).

A transdisciplinary model transcends disciplinary boundaries, and creates new and innovative disciplinary modes through the unity of theory with praxis among multiple disciplinary perspectives. It is characterized by a knowledge production that attempts to span both academic and professional frontiers, using an integrated approach to create bridges between different disciplines. (Lawrence and Despres 2004; Harris, Lyon, and Clarke 2009; Russell, Dolnicar and Ayoub, 2007).

Interdisciplinary and transdisciplinary approaches provide potential educational benefits that can develop into lifelong learning skills that

remain essential to a student's future development. The benefit of working within and across disciplines provides a thorough and well-rounded approach to preparing students for creative knowledge production in the creative disciplines. More standardized disciplinary approaches to education are critiqued as unable to provide sufficient breadth to develop and address students' collaborative skills and knowledge. Interdisciplinary methods are recognized as fundamental to addressing this challenge. When students are educated with a single discipline method, or one subject at a time, knowledge is fragmented and a student's understanding of themselves, the world, and their culture becomes restricted. Generally, students are more highly motivated when they are actively interested in pursuing an education which intrigues them and uses content based in life experiences, creating an authentic purpose for learning. The exploratory nature of interdisciplinary methods causes students to look at a wide variety of perspectives from which a topic can be explored, and internalize an open minded approach – not just toward research but to fellow students with different ideas (Boyer and Bishop, 2004). Transdisciplinary study is also necessary to provide students with the proficiency necessary to manage the plurality and complexity of knowledge (Bracken and Oughton 2009).

The emphasis on personal growth, or thriving for students, is often forgotten in the quest to grow within a predetermined framework, as Jantsch (1970) predicted nearly five decades ago. But with transdisciplinary and interdisciplinary methods of education, the university produces dynamic, sharp graduates who do not simply function well in society but can often become leaders within it. Arguably, this discipline blurring approach also mirrors the practices and breadth of experience that graduate will encounter in the industries they aspire to work in.

There are three key cautions and critiques however, when undertaking the project of incorporating transdisciplinary and interdisciplinary methods into the educational system. Firstly, there is a balance to be struck between detailed specialization of a subject area versus generalized knowledge of several subject areas (Burchell 1971). Secondly, it is crucial that curriculum is fully developed and rationalized in order to support a successful programme. Finally, achieving genuine interdisciplinary or transdisciplinary education relies heavily on the collaboration among the educators. When these critiques are addressed, students and teachers alike can advance in critical thinking, communication, creativity, pedagogy, and essential academia with the use these two techniques (Jones 2010).

1.6 Purpose-driven Approaches

Another key driver in this study was the desire to ensure that any new academic framework would nurture and harness so-called purpose-driven approaches to creative education. Arguably, the diversity of communities – both stakeholders and constituencies, has resulted in new relationships within and between higher education institutions and in the external local communities they serve. The ability to devise efficient means of curating these relationships is held to be a prime criterion for higher education institutions to be considered as innovative and responsive (Brennan, 2008). As well as playing an essential role in the process of social reproduction, education is always, simultaneously, a major source of social transformation, providing learners with those critical and reflective forms of consciousness and understanding that will enable them to participate in the creation of an improved and more desirable form of social life than that which currently exists. Bracher (2006) argues that real learning involves a transformation of the student, and therefore there can be no such thing as a purely neutral or amoral educational transaction. Thus, in higher education pedagogy of widening participation (as is at This institution) would involve processes of the educational development of individuals in a participatory and inclusive university and its external communities in which gaining knowledge and constructing successful learner identities go hand-in-hand (Walker, 2003).

In seeking to embed such purpose driven creative educational approaches into the curriculum, it seems that a social justice imperative needs to present. Social justice can be defined as encompassing themes of empowerment, integration, and transformation (Walker, 2003). Whether the focus is on the individual student learning in new ways through a service-learning course to become a self-motivated learner or on a university/community collaborative venture involving multiple government agencies and public institutions, the goal should remain to facilitate the empowerment of those in statuses that have been traditionally disempowered. At an institutional level, it is important to transform community-based scholarship and teaching so it becomes a catalyst for larger societal change. Although space here does not permit in depth case studies, both the University of Brighton's Social Engagement Strategy and the University of Pennsylvania's Netter Center for Community Partnerships are often cited as examples of what some universities are currently doing to engage their institution, faculty, and students with the surrounding community.

1.7 Learning and Technology

Ravensbourne University has identified itself as a 'digital creative village' in recent years, and the role of technology in learning has become central. Learning highly technical skills does not necessarily have to come at the expense of creativity however. In fact, technology can be creatively driven (Bryant 2010). There is a reciprocal relationship between creativity and digital technologies; technologies allow for new and creative pedagogical practices, but educators in turn must also develop a creative mindset to teaching and learning. The best uses of educational technology seem to be grounded in an approach that embraces openness for new and intellectual risk-taking. (Mishra, Koehler, and Henriksen, 2011). Progressive creative education programmes then, arguably need to combine strong pedagogic content and processes as well as space to allow students to use this content for their individual creative self-expression using technology.

Henriksen, Mishra, and Fisser (2016) suggest that progressive academic frameworks need to connect creativity and technology to curriculum development strategies. There needs to be specific modules or programmes which focus explicitly on creativity and technology, as well as a broader application of integrating and embedding these concepts across the curriculum, and featuring creativity and technology in policy at all undergraduate levels. Assessment of creativity, with and without technology, exists within a range of tensions and dilemmas, so it is important to use alternative forms of assessment with dynamic and flexible approaches to support the widest possible student achievement.

Bryant (2010) suggests several strategies to nurture well developed high-tech abilities with high concept applications. High concept here involves the ability to create artistic and emotional beauty, to detect patterns and opportunities, to craft satisfying narrative and to combine seemingly unrelated ideas into a novel invention via technological mediums. The first suggested strategy is the use of open-ended assignments, provoking students to make personal choices about fluid problems. The second is mind-mapping, brainstorming, and storyboarding, to encourage planning before diving into a technically charged environment. The third strategy involves the inclusion of symbolism or metaphor, as it is described as being partially rational and partially creative. The fourth is peer conversations, which help to encourage a collaborative culture that allows creativity to flourish. The fifth and final strategy is teacher-directed critique, which considers the overall meaning of an artifact – the effects used to achieve that meaning, and areas for improvement. If a reciprocal

relationship between creativity and technology in learning and teaching is to thrive in education institutions, there needs to be active institutional support and tolerance of experimentation and risk taking by staff and students (Martin, Morris, Rogers, Martin and Kilgallon, 2009).

1.8 The Mindsets and Skillsets Manifesto: The Ravensbourne Five Principles

The culmination of the overarching research, that included the Literature Review, the various visits to national and international conferences and institutions, the Futures in the Making Symposium, the 20/20/20 Lecture Programme and the market analysis of courses was the creation of '*Blueprint for a Manifesto*'. Presented as a new academic vision that, through the implementation of '*Mindsets and Skillsets Manifesto*', will position the institution with a unique offering; competitive advantage, an enriched and relevant student experience and situate the institution as an innovative world-leading design and media university. This vision was then presented as the '*Mindsets and Skillsets Manifesto*' at three key forums: the Ravensbourne Staff Conference, Course Leaders' Away Day, and to the Board of Governors, and became the guiding framework for all training, briefing and implementation.

1.9 Mindsets and Skillsets Manifesto:

Principle 01: Cultivate / where the individual thrives

- Holistic Education: beyond the discipline
- Life Skills: resilience, self-efficacy, multiple intelligences

This principal drew heavily on the 'thriving' literature discussed here and indicated a radical motivation to put so-called 'soft skills' personal development on equal footing with skills acquisition and intellectual rigor. Traditionally such emotional intelligence (EQ) nurturing is partitioned off into Student Services or 'specialist workshops' outside of the core curriculum. By positioning this critical developmental range of mindsets at the heart of the manifesto, an intentional signal was being communicated: nurturing the development of the *whole* individual has to be prioritized. The final descriptor developed to articulate this read as:

Extending the norms of skills-acquisition and competency-based approaches *Cultivate* nurtures the creative individual beyond the academy, embracing the holistic notion of educating the whole person. Critical life-skills are investigated and multiple intelligences explored through a model that supports professional and personal development to create and support resilient and inclusive individuals prepared for work in the ever-changing creative industries and for living with wider societal and cultural flux in the 21st century. *Cultivate* intends to embed such modes into the curriculum in order to nurture rounded practitioners who are strong team players and self-reflective Creatives who are fully prepared for the world of work.

Principle 02: Collaborate / where disciplines evolve

- Blurring Disciplines: petri dish for new thinking and practice
- Shape-Shifters: new practice demands new practitioners

The *Cultivate* principal sought to reflect on many of the great pockets of innovative practice seen at a number of visited institutions (E.G. Stanford's D School/ University of Southern California's Jimmy Lovine and Andre Young Academy), and on the inter/transdiscipinary literature. This institution's course programmes have historically been designed to nurture a broad skills and attributions base in students. There is, however, a need to reinforce the transferable skills students gain during their study (e.g. communication, critical thinking, time management, problem solving etc). The rapidly shifting nature of the digital creative industries also requires the advanced development of a robust range of cross-disciplinary employability skills such as: teamwork, negotiation, collaboration, self-awareness and being able to reflect on one's own practice, and able to generate one's own workload and self-management.

Working across discipline and course boundaries students can be introduced to each other's working environments, exposing them to alternative curiosities, methods, practices and social concerns. Such an approach fosters new questioning and knowledge that changes traditional learning habits and develops agile high performers. The resulting descriptor developed to articulate this principal read as:

> The *Collaborate* model enables students with discipline-specific knowledge to apply their own creative thinking, design and media practices and methodologies and production techniques to inter-disciplinary and trans-disciplinary projects. Inter-disciplinary project models integrate subject knowledge and working methods from a range of disciplines to create synthesis of practice, whilst the trans-disciplinary model creates new and extended disciplinary modes through the unity of intellectual and practice-based frame-works to reach beyond single disciplinary perspectives.

Principle 03: Integrate / where education engages industry

- Professional Modes: education mirrors industry
- Depth and Breadth: specialists and generalists

This principal sought to build on the interdisciplinarity of the *Collaborate* principle and integrate its core ambition – to exploit the blurring of the lines between single subject disciplines into the curricula of each Course, Department and School. As far back as 1971 Burchell was highlighting the benefits of such as approach:

> The single discipline (or subject-at-a-time approach…) fragments a student's world view and restricts rather than promotes his understanding of himself, his culture, and the world. Justification for transdisciplinary study is based on the key assumption that, as a result of such study, the learner will be equipped to cope with the plurality and complexity of organized knowledge… The main task of the human intellect is to put things together in comprehensive patterns, not to separate them into separate compartments. This means that the education of college students must be arranged so that each will have the chance to escape from the constriction of specialized knowledge, and can learn to look at the world as a spaceship with identifiable andworld-wide characteristics." (p.1)

The *Integrate* principle imagines a creative container that becomes such a fluid hub of pedagogic excellence and professional practice. These hubs should also mirror as accurately as possible the professional structures that serve the creative industries. So for example the engine of any adver-

tising agency is its creative department that functions to develop concepts and campaign briefs to diverse content ouputs. The roles that serve this endeavor include: art directors, designers, production artists, web designers, creative directors, and specialist creatives in print, broadcast or digital media, photographers and video production. By designing curricula and pedagogic structures that support the cross over and collaboration of these functions (which span many of our courses), This institution can more dynamically engage its students, staff, and employers.

The descriptor developed to articulate this principal read as:

> This model integrates academic delivery with industry practice; enabling subject specific, interdisciplinary student teams to replicate modes of working found within relevant professional models; the Production House in Film and TV, the Design Studio in communication and media design, the Fashion House in fashion and textiles, the Advertising Agency in advertising and promotion and the Architecture Practice in architecture and interiors.
>
> Typically, the Integrated Team, with each member assigned a specific role, works to a phased delivery that may include the Discover, Define, Develop and Deliver stages of the Design Double Diamond. *Integrate* challenges traditional constraints in the teaching of the solo practitioner and embraces the notion of disciplinary discovery and practice through team working. The *Integrate* principle imagines a creative container that becomes such a fluid hub of pedagogic excellence and professional practice.

Principle 04: Advocate / where purpose meets practice

- Citizen Practitioners: tackling real-world problems
- Self to Selves: from the individual to the collective

The development of the *Advocate* principle sought to harness student creativity and reflect a commitment to purpose driven and sustainable education. As the British Government's own research on this concluded: 'The best way to educate people about sustainable development is to help them discover what the term encompasses, what it means, and how it should affect the ways they live their lives ... By helping people to understand and engage with the concept... they will discover sustainable

development for themselves and begin to apply it within their world...' (Higher Education Partnership for Sustainability)

As such *Advocate* intends to nurture a greater commitment by all staff and students to reflect this in its creative outputs. Assessment briefs and industry and social projects should aim to provoke and inspire our cohorts to produce provocative and inventive work portfolios, show-reels and creative collections. Working with external agencies, charities and businesses, This institution will be at the forefront of producing and exhibiting work that is recognized for developing innovative solutions to the problems of sustainable development.

The descriptor developed to articulate this principal read as:

> Putting purpose first, *Advocate* recognizes the responsibility for creative education to address the unprecedented environmental, social and economic challenges facing humankind; tomorrow's designers and media practitioners are increasingly aware of their responsibilities as global citizens to engage with complex ethical issues related to climate change, social justice, interdependence, wellbeing and bio-diversity.
>
> *Advocate* puts studio projects and commercial and charitable industry commissions at the centre of the educational experience enabling the student real-world opportunities to improve the communities in which they live and work and in turn begin to transform the wider world. As such *Advocate* intends to nurture a greater commitment by all staff and students to reflect this in its creative outputs.
>
> Assessment briefs and industry and social projects should aim to provoke and inspire our cohorts to produce provocative and inventive work portfolios, show-reels and creative collections. Working with external agencies, charities and businesses, This institution will be at the forefront of producing and exhibiting work that is recognized for developing innovative solutions to the problems of sustainable development.

Principle 05: Originate / where creativity meets technology

- Mind-Sets + Skill-Sets: the dynamism of ideas + technology
- Applied Mastery: leveraging theory, practice and innovation

This institution has a historic commitment to the creative use of technology at the core of its DNA. As reflected in the ambition of all *Five Principles* here, the skills necessary for success in the modern world transcend traditional academic, creative and technological boundaries. The *Originate* principle builds on the outstanding reputation the college has for its ability to produce technically strong graduates who can seamlessly move into industry level jobs. *Originate* will more deeply integrate the leveraging of theory, practice and innovation in its students leading to breakthrough visualisations, products, systems, technologies and disruptive creativity.

The ideas-led use of technology, underpinned by a relevant and integrated contextual studies programme will foster highly original and thoughtful course project outcomes. Innovative briefs and reflective practice to create thought-leading solutions by employing leading edge technology to express the necessary business, entrepreneurial and creative expressions, will support students in this aim.

The descriptor developed to articulate this principal read as:

> Sitting at the intersection of creativity and technology, *Originate* enables the merging of visionary mind-sets and skill-sets to provide provocative and challenging design and media approaches. *Originate* embraces both integrated and agile design-thinking and design-doing practice and research methodologies to forge dynamic technologically-savvy and creativity-driven responses and solutions to given and self-directed industry-leading projects.

Conclusion

This study proposes a new manifesto for the delivery of a more holistic creative education in design and media at Ravensbourne. Questioning historic paradigms across the sector, mainly unchanged for many decades, this study determines that only radical rethinking of the rationale for design and media education will create a meaningful and purposeful student experience.

Data gathered for this study included a literature review, feedback from national and international institutional visits, an industry and academic panel symposium, and consultations with the university's academic community. The resulting *Mindsets and Skillsets Manifesto* and its *Five Principles* offer a radical new curriculum framework.

The *Mindsets and Skillsets Manifesto* commits to placing student thriving, a key feature, at the center of the student experience. Thriving, in this case, refers to the broadest notion of student success – from nurturing multiple intelligences and developing resilience to modes of working and studying that will prepare graduates for the rapidly changing industries into which they graduate. *Mindsets and Skillsets* is also designed to inspire student cohorts to reach towards purposeful approaches to their practice and intellectual endeavor.

Critical next steps in the development of the *Mindsets and Skillsets Manifesto* include the crucial the implementation of and the embedding of the manifesto across the institution. It is envisaged that his study will also provoke deeper investigation and research into developing creative curricula that will serve students in supporting their ambitions to shape and influence the industries and cultural sectors they will be employed within. In an uncertain and changing economic and political climate, this must be an essential ambition for the whole sector.

Gary Pritchard
Dean School of Media, Ravensbourne, UK
g.pritchard@rave.ac.uk

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What is the value of knowledge exchange?

Lara Salinas

Abstract

Knowledge exchange is a collective and collaborative practice that together with research and education has become the third mission of higher education institutions. In the higher education context, knowledge exchange is an umbrella term used as a shorthand for x-disciplinary collaboration between academia and business, public and third sector organisations, that delivers innovation. The landscape of knowledge exchange in higher education is complex and moves along the spectrum of research, knowledge transfer and education resulting in a myriad of knowledge exchange practices, involving very diverse mechanisms, objectives, actors and external collaborators, and therefore generating a wide array of value and impacts.

This paper reports on research in-progress commissioned to better understand the distinctive value of knowledge exchange activities in the arts and humanities, and in particular to explore how might the value that arts and design knowledge exchange activities deliver to external organisations be more effectively identified, captured and communicated. The research follows an inclusive and participatory approach that includes literature review and workshops with academics and officers experienced in knowledge exchange.

Finally, the author argues that currently institutionalised methods to account for the impact of knowledge exchange activities miss out, and shares work in-progress towards a framework to approach the qualitative value of knowledge exchange activities in the context of arts and humanities that takes into consideration (1) what is knowledge exchange, (2) inputs, enablers and barriers, (3) mechanisms, and (4) outputs, outcomes and impacts.

Theme: Innovation
Keywords: knowledge exchange, creative exchange, participatory design, impact, evaluation

1. Situating knowledge exchange

Knowledge exchange is a collective and collaborative practice that together with research and education has become the third mission of higher education institutions. In the context of higher education, knowl-

edge exchange is used as shorthand for collaboration between academia and a non-academic organisations such as business, public and third sector organisations across-disciplines.

There is no single definition of knowledge exchange. The term is often used as an umbrella for concepts such as co-production, transfer, storage, exchange, transformation, translation of knowledge and social learning (Evely et al. 2012). Literature on knowledge exchange is related to the fields of knowledge management, knowledge transfer, technology transfer, knowledge broker, knowledge mobilization, co-production of knowledge, and innovation; each concept implying different meanings for knowledge exchange (Fazey et al. 2014). Fazey et al. broadly define knowledge exchange as 'a process of generating, sharing, and/or using knowledge through various methods appropriate to the context, purpose, and participants involved' (2013, p.19), that occurs in some form of applied research either through formal or informal mechanisms and processes in which researchers engage with others (Fazey et al. 2014).

The landscape of knowledge exchange in higher education is complex. Knowledge exchange activities unfold within the context of research, knowledge transfer and education. In the United Kingdom, Research Councils United Kingdom (RCUK), Innovate UK and Higher Education Funding Council for England are three of the main bodies that support knowledge exchange activities in higher education institutions.

Innovate UK and the Knowledge Transfer Partnership programme aims to help UK businesses and non-profit organisations to accelerate innovation by through a better use of knowledge, technology and skills that reside within UK academia. The Arts and Humanities Research Council (AHRC) – one of the Research Councils UK (RCUK) – defines knowledge exchange as the 'co-production of new knowledge through the interaction of academics and non-academic individuals and groups, which is of benefit to both parties and is distinct from the one-way dissemination of research findings'. In this line, the AHRC-funded Knowledge Exchange Hubs for the Creative Economy (2012–2016) have explored knowledge exchange with creative industries. The core methodology of the KE Hubs has focused on the co-production and co-design of knowledge, goods and services, establishing and nurturing partnerships. In doing so, the KE Hubs have developed new models of *creative exchange* based on an understanding of collaboration as co-creation, in which the value of collaborative work extends far beyond passive transfer of knowledge from one sector to another (Senior et al. 2016).

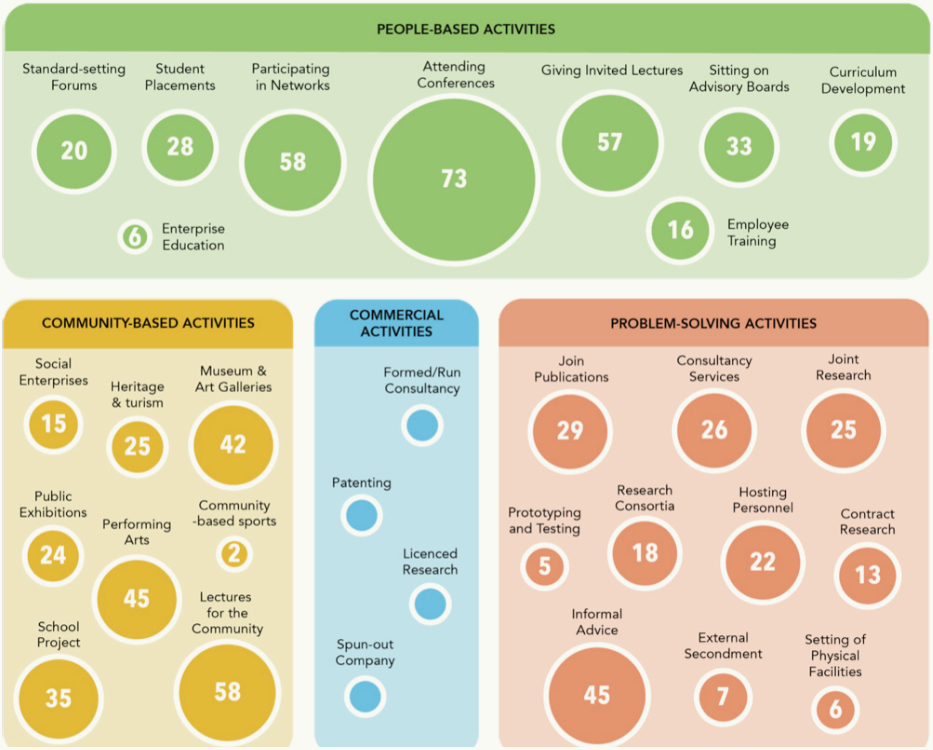


Figure 1. Academic external interaction activity and commercialisation in the last three years (% of respondents) in the arts and humanities. Visualisation based on Hughes et al. 2016.

In contrast with the narrow approaches of Innovate UK and RCUK/AHRC to what constitutes knowledge transfer and/or exchange, the Higher Education Funding Council for England employs the term knowledge exchange in a broader sense as a 'shorthand for the multiple interactions between HEIs and businesses, public services, charities and communities to create social and economic benefit' (HEFCE, 2017, np). The broad landscape of knowledge exchange mechanisms is typically categorised in four families (PACEC, 2012; Hughes et al. 2016; HEFCE, 2016) (Figure 1):

- Problem-solving activities: Informal advice, joint research, prototyping/testing, joint publications, external secondments, creation of physical facilities, contract research, consortia, consultancy.
- People-based activities: external lectures, external visits, curriculum development, network, standards forums, organising confer-

ences, post-course placements, enterprise education, attending conferences, CPD/courses, advisory boards.
- Community-based activities: public lectures, performing arts, school projects, community sports, exhibitions
- Commercialisation activities: Patenting, licensed research, spin-out company, formed/run consultancy.

Therefore, HEFCE account of knowledge exchange mechanisms includes include research, knowledge transfer, and teaching, such as joint research and development projects, spinning out companies and licensing intellectual property, or training and enterprise education respectively, as well as other forms of public engagement such as performing arts and public exhibitions.

2. Pathways to impact

As public institutions, these funding bodies have established processes to assess the excellence of publicly funded activities, as well as pathways to impact to inform further allocation of funds and career progression. As it is to be expected, each organisations accounts for excellence in their remit, according to their respective missions and metrics. In research, the Research Excellence Framework (REF) assesses the research impact of British higher education institutions; as does the equivalent Teaching Excellence Framework (TEF) for excellence in teaching and learning. In October 2017, the development of a Knowledge Exchange Excellence Framework (KEF) was announced to benchmark performance from university-business collaboration and knowledge exchange, alongside REF and TEF. Universities are currently being consulted aiming to develop new metrics to rigorously evaluate knowledge exchange activities (Johnson 2017), and it must be noted that to date it is unclear whether and how non-economic impact would be accounted for by KEF.

The Higher Education Funding Council for England (HEFCE) provides funding for knowledge exchange via the Higher Education and Innovation Fund (HEIF). The HEIF funding is allocated on the basis of how well universities are doing in their interactions with businesses and the community. The Higher Education Statistics Agency (HESA) undertakes the collection and analysis of the Higher Education Business and Community Interaction survey (HE-BCI) from higher education providers (HEPs) – all UK publicly funded higher education institutions (HEIs) and a number

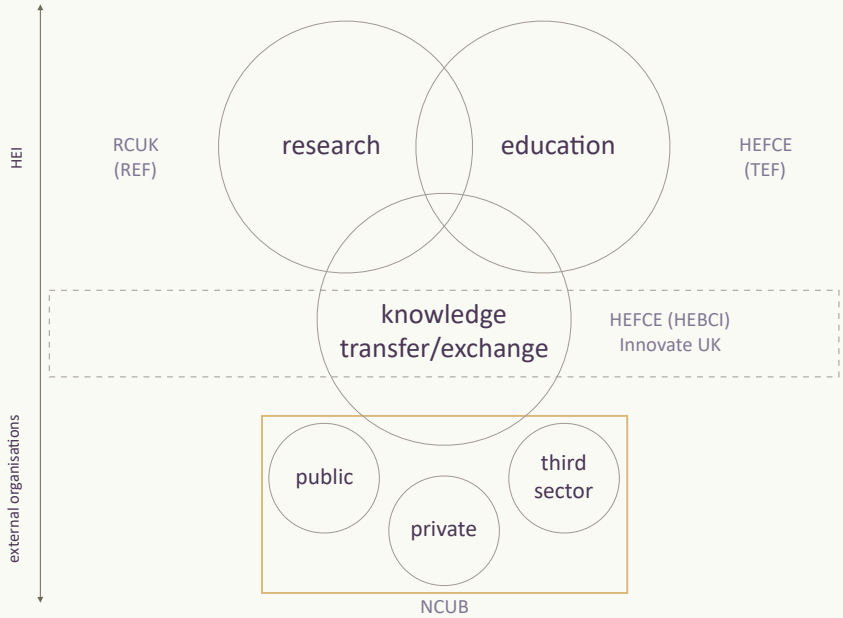


Figure 2. Simplified landscape of organisations (and systems) that support and assess interaction between higher education institutions and external organisations (early 2018)

of alternative providers (APs). The HE-BCI survey 'captures a range of qualitative and quantitative information on research and innovation activities' (RCUK 2016, p.8). It consists of two main section sections: Part A consist of a qualitative questionnaire designed to collect information on the infrastructure, capacity and strategy of HEPs. Part B is concerned with gathering numeric and financial data, which is used as a proxy to assess HEP's engagement with the economy and society. (HESA –n.d.)

As a proxy for impact, HE-BCI captures income metrics from collaborative research, contract research, consultancy, facilities and equipment related services, Continuing Professional Development (CPD) and Continuing Education (CE), regeneration and developing, and intellectual property; and numeric but non-income metrics from disclosures, patent application, licenses, HEI and formal spin-offs, staff and graduates' start-ups and public events. HESA acknowledges that as a 'low-burden questionnaire' it is 'likely not to capture everything given the complexity of such interactions'. Nevertheless, HE-BCI should reflect 'the majority of HEP's third stream income' (HESA, n.d.).

1.1 A gap

HEFCE broadly approaches knowledge exchange as interaction between academics and non-academics aimed at 'creat[ing] social and economic benefit' (HEFCE, 2017, np). The current assessment instrument's use of income metrics as a proxy for impact places overemphasis on economic benefit and largely oversees the social benefit that knowledge exchange activities may generate. Therefore, it would seem that new success metrics that acknowledge wider public benefit of knowledge exchange activities are required (Dowling 2015).

Knowledge exchange activities are often initiated through informal mechanisms that 'may not require contractual and transactional services' (Hughes et al. 2016, p.43) offered by universities' administrative offices. For instance, Hughes et al. (2016) identified 27 non-commercial modes of interactions (i.e. problem-solving activities, people-based activities and community-based activities) (Figure 1) and highlighted the dominance of non-commercial interactions in all disciplinary fields. However, the role of administrative departments which are tasked with community engagement, partnerships, strategy and innovation is paramount, as these departments are typically responsible for the completion of the HE-BCI survey. It seems safe to assume that collaborative activities that have not passed through universities' administrative offices are unlikely to be reported to HE-BCI, and that knowledge exchange activities which inputs, outputs or outcomes are not quantified and reported to HE-BCI are not accounted for in terms of knowledge exchange excellence.

In 2015 HEFCE commissioned a study to evaluate the non-monetised achievements of the Higher Education Fund (PACEC, 2015). The study notes significant non-monetised benefits to private, public and third sector organisations from participating in knowledge exchange, such as development of new products and processes, improvement of business performance, benefits to the wider regional and national economy, gain insights and trends opportunities, broaden networks and new contacts, growth of enterprise and strengthened skills for entrepreneurs, improved professional skills and generation of jobs and recruitment of new talent.

Currently (early 2018) there are no mechanisms in place to assess and report on the non-monetised benefits that knowledge exchange activities deliver to private, public and third sector organisations.

2. Method

This paper reports on research in-progress (September 2017 – September 2018) commissioned by the University of the Arts London. The University of the Arts London (UAL) is a large arts and humanities university based in London (United Kingdom) composed by six colleges: Camberwell College of Arts, Central Saint Martins, Chelsea College of Arts, London College of Communication, London College of Fashion and Wimbledon College of Arts. The research commissioned by UAL aims to better understand the distinctive value of knowledge exchange activities in the university and across colleges, and in particular to explore how might the value that arts and humanities knowledge exchange activities deliver to external organisations be more effectively identified, captured and communicated.

The research has been motivated by acknowledgement of the diversity of knowledge exchange practices in arts and humanities, and the conviction that current institutionalized methods to account for the value and impacts of knowledge exchange activities miss out. The research focus is to enhance understanding of the value that knowledge exchange activities within the University of the Arts London – and potentially other arts and humanities higher education institutions – deliver to external organizations, and in doing so contribute towards developing a framework to qualitatively capture the value of knowledge exchange activities in arts and humanities.

It is worth noting that the purpose is not to evaluate, 'as the process and product of making judgements about the value, merit, or worth' (Mathison, 2008, p.183), but to conduct research to better understand the ecosystem, value and impacts that knowledge exchange activities in arts and humanities higher education institutions deliver to external organizations. The research is empirical, exploratory and descriptive and do not aim to reach evaluative conclusions.

The research follows an inclusive and participatory approach divided in five stages:

1. A systematic literature review. Given the time and resource limit of the project the research strategy aimed to be as broad and comprehensive as possible, but not exhaustive. The primary focus of the literature search has been on materials related to knowledge exchange, on published research and grey literature. In addition to academic publications that explore knowledge exchange in thecontext of arts and humanities, the literature includes reports

published by HEFCE, RCUK with emphasis on the AHRC KE Hubs, and the National Centre for Universities and Businesses (NCUB).
2. Six workshops with academics and officers experienced in knowledge exchange (in progress). The workshops, which designed has been informed by the literature review, aim at unearth current practices around knowledge exchange, with a focus on best practices, challenges and opportunities. The workshops have also offered an opportunity to iteratively develop tools that may assist academics and officers to identify and capture the value that knowledge exchange activities deliver to all actors involved, with emphasis on external organisations.
3. Further development of the tools iterated throughout the workshops, and rollout of the tool across colleges.
4. Development of a case study template, informed by the insights on current knowledge exchange practices gained through the workshops. The case study template would be flexible and favour the sharing of qualitative value and impacts. The case study template would be tested and iterated in the production of six case studies selected to be representative of the diversity of knowledge exchange activities across colleges.
5. Report that acknowledges the university's distinctive approach to knowledge exchange, different pathways by which knowledge exchange activities generate societal and economic impact, and aprovision of tools and recommendations to capture and possibly monitor the value of knowledge exchange activities.

The framework for structuring the literature review has been inspired by Fazey et al. (2014). The authors propose overarching principles for evaluating knowledge exchange in the context of interdisciplinary and multi-stakeholder environmental change research, that appeal to be transferable to knowledge exchange in other disciplinary contexts. The authors account for three main factors in designing methodology for knowledge exchange evaluations: Firstly, the selection of evaluation methodologies need to take into account both how knowledge exchange is conceptualized and how is knowledge exchange implemented. These factors are in turned influenced by actors' epistemological and ontological positions. Secondly, evaluative methods must be appropriate for the specific practice, considering, formative and summative, non-participatory and participatory, quantitative and qualitative, deductive and inductive, internal

and external etc. Thirdly, the design of methodologies for knowledge exchange evaluations must consider the outcomes evaluated.

4. Understanding the value of knowledge exchange

Drawing on the overarching principles for evaluating knowledge exchange proposed by Fazey et al. (2014), the author proposes a framework (in progress) to approach the diversity of knowledge exchange activities in the arts and humanities. The framework (Figure 3) relates 1) inputs and enablers that support the articulation of knowledge exchange mechanisms, 2) mechanisms that support the practice of knowledge exchange activities, and 3) outputs, outcomes and impact generated by the practice of knowledge exchange.

The framework takes into consideration:

1. What is knowledge exchange? How is knowledge exchange conceptualised by the different actors involved?
2. How is knowledge exchanged? What are the *mechanism(s)* that support knowledge exchange? What are the inputs, *enablers* and barriers to that support the mechanism?
3. What are the outputs, outcomes and impacts of knowledge exchange activities? How do outputs, outcomes and impacts of knowledge exchange activities become apparent? What outputs, outcomes and impacts are accounted for?

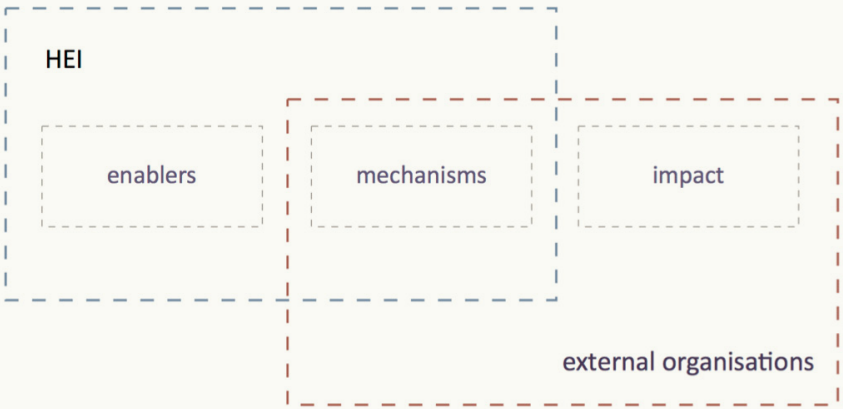


Figure 3. The impact of knowledge exchange activities for external

4. How is the value of knowledge exchange activities captured and communicated? When, by whom and for what audiences?
5. Firstly, we would consider how knowledge exchange is conceptualised, for example, whether it refers to the 'co-production of new knowledge through the interaction of academics and non-academic', to any interaction between academics and external organisations, or whether knowledge exchange is a means of design participation (Bowen et al 2016). Secondly, we would look into what *mechanisms* support the practice of knowledge exchange, with the assumption that the mechanism would reveal details about the scope and complexity of the project, and potentially would give indications of expected and emergent outcomes. It would also be appropriate to consider what are the *enablers* that support such knowledge exchange activity. Thirdly, we would reflect on what are the outputs and outcomes of knowledge exchange activities, whether expected or emergent, how can be identified, and what outputs and outcomes are accounted for and reported. Finally, how, when, by whom and for what audiences is the value of knowledge exchange activities communicated.

4. Conclusion

This paper has reported on research in-progress commissioned to better understand the distinctive value of knowledge exchange activities in the arts and humanities, and in particular to explore how might the value that arts and design knowledge exchange activities deliver to external organisations be more effectively identified, captured and communicated. The author has argued that currently institutionalised methods to account for the impact of knowledge exchange activities miss out, and has shared work in-progress towards a framework to approach the qualitative value of knowledge exchange activities in the context of arts and humanities that takes into consideration (1) what is knowledge exchange, (2) inputs, enablers and barriers, (3) mechanisms, and (4) outputs, outcomes and impacts.

Lara Salinas
Senior research fellow, UK
l.salinas@lcc.arts.ac.uk

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Systems Thinking in Design Education

Together, how to foster innovation?

Massimo Santanicchia

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Systems Thinking in Design Education

Abstract

This paper is an intellectual reflection on the benefits of introducing systems thinking at the core of design education with the specific case study of the design course *Together-Repair* held at the Iceland Academy of the Arts (IAA) in Reykjavik.

The first part of the paper focuses on the overarching ideas, debates, and educational paradigms that undergird the course.

The second part focuses on *Together-Repair* as a case study: the structure, examples, and impacts/outputs.

In the first part systems thinking is illustrated as an educational paradigm and a critical tool to address complex challenges. Systems thinking helps us manage, adapt and see the connections between our choices and their impact. Thinking in systems therefore brings us closer together, not only to see the world and its components, but to feel that we are part of it. By applying systems thinking on the design process of the course *Together-Repair* four important educational paradigms emerge upon reflection: diversity, engaged scholarship, place-based education, and collaboration.

Diversity means the inclusion of many different types of people into the design process. Engaged scholarship means connecting academic knowledge and real issues present in our community; opening the doors of the school to the otherness.

Place-based education is about understanding the context, the environment, cities, and societies where we live and from where we operate.

Collaboration is at the base of systems thinking and it is a key component not just for problem-solving but for developing dialogues.

In the second part, the paper illustrates the experience developed during the eight-week multidisciplinary design course *Together-Repair* that has been running at the IAA since 2014. In *Together-Repair* diverse students, – second year BA students in Architecture, Fashion Design, Product Design, Visual Communication, first year students in the MA design – teachers, and local agents (people who have been selected by students as collaborators), collaborate on important themes that resonate strongly in the Icelandic context and which is also deeply connected to global issues. Together, possibilities become actions on reality capable of influencing everyday practice.

Together-Repair is our contribution as educators and students to developing "engaged scholarship" to seek, see, and understand the connectedness of everything, the systems that link us all, and the great responsibilities that are connected to our decisions not only as designers but as human beings. We believe that no one owns a problem and each problem is universal and therefore the solution must be found in our collective work, in transdisciplinary approaches, in changing behaviour, in understanding our realities, and in a revaluation of our modes of praxis. Working together therefore means recognizing diversity in skills, attitudes, and thoughts.

Together-Repair has shown that when diverse students engage together with local agents on real case studies they become social agents. Education therefore is not only about cultivating scientific factual knowledge but just as much about empathy and emotional intelligence. *Together-Repair* represents a case study in which design tools are used to explore and engage with our society and for the betterment of people´s existence.

Theme: Innovation
Keywords: systems thinking, design, diversity, engaged scholarship, place-based education, collaboration

1. Educational paradigms

1.1 Systems thinking

Systems thinking is a critical tool used to address complex challenges. It helps us manage, adapt, and see the connections between our choices and their impact (Meadows, 2008) (Ackoff, 2010) (Senge, 2006). A recent article published in 2017 by The Guardian states that: "Henderson Island, part of the Pitcairn group, is covered by 18 tons of plastic – the highest density of anthropogenic debris recorded anywhere in the world" (Hunt, 2017). This fact captures the devastating effect that human behaviour has on our planet. Considering that the outcomes of our choices, lifestyles, and design solutions – in this specific case plastic products – can reach one of the world's most remote places, it means literally that the entire world is impacted by our decisions. The plastic found on Henderson Island comes from everywhere: Canada, Germany, New Zealand. It is therefore a reminder that we are all connected and all responsible; it is

truly a common tragic problem that can be solved only if we understand that we are part of the same system and must therefore work collaboratively. The plastic crisis is part of a long list of ongoing catastrophic human actions: from climate change, to increasing social inequalities, from refugee crisis, to fast urbanization. New Zealand author, educator, and architect Elizabeth Farrelly states: "it is a crisis of significance, where we must grasp the essential connectedness of everything, and reinvest in our source of meaning, or die" (2008, p. 11). Canadian activist and writer Naomi Klein, urges the world to make the shift from hyper individualism to interdependence, from dominance to reciprocity, from hierarchy to cooperation, in short, a complete reconsideration of the way we relate not only to nature but to each other. To make this shift we need empathy and "we need to rebuild and reinvent the very idea of the collective, the communal, and the civic after so many decades of attack and neglect" (2014, p. 460).

Systems thinking, as it is defined by the American systems scientist Peter M. Senge in the book *The Fifth Discipline*, is a way to see ourselves connected to the world: "it is a framework for seeing interrelationships rather than things, for seeing patterns of change rather than static snapshots" (2006, p. 68). The connectedness of the world allows us to see all the people not only as responsible for problems but also as "participants in shaping their reality" (2006, p. 69), and indeed their future. Senge also states that: "As people see more of the system within which they operate, and as they understand more clearly the pressures influencing one another, they naturally develop more compassion and empathy" (2006, p. 161). Thinking in systems therefore brings us closer together not only to see the world and its components but to feel that we are part of it; we are part of the same system, we are together.

The word design comes from Latin: *designare*, which means: to mark, to make a sign, to make a difference, to contribute, to choose. Making something, distinguishing it by a sign, giving it significance, designating its relation to other things, owners, users etc. The intentionality of choice is therefore embedded in the word of design (Verganti, 2009). The human capability to design, (and to organize) does not belong only to design experts but it is a human quality that belongs to each of us. So, the more people use design capability to connect to a plethora of issues and to multiple crises present in our society, the more opportunities there are for design experts to help design these processes. To do so, designers need to develop appropriate skills and collaboration is one of them (Manzini, 2015).

The design course *Together-Repair* – that has been taught at the Iceland Academy of the Arts (IAA) since 2014 – is our contribution to addressing the immense social and environmental crisis that is sweeping our planet. It is our effort as educators and students to develop "engaged scholarship" to seek, see, and understand the connectedness of everything, the systems that link us all, and the great responsibilities that are connected to our decisions. We believe that no one owns a problem; that each problem is universal, and therefore the solution must be found in the diversity of thoughts, in our collective work, in transdisciplinary approaches, in changing behaviour, in a revaluation of our praxis and modes (Ackoff, 2010). This requires the deployment of components based on collaboration and empathy. Alastair Faud-Luke author of *Design Activism, Beautiful Strangeness for a Sustainable World* defines a

> "designer activist as a person that uses the power of design for the greater good of humankind and nature. A person who is a free agent; a non-aligned social broker and catalyst; a facilitator; an author; a creator; a co-author; a co-creator; and a happener (someone who makes things happen)" (2009, p. 11).

We believe designers need to be all of this and moreover need to be activists. They need to cross the physical and intellectual borders which so many times have been constructed in the name of efficiency and clarity, perhaps as a reminiscence of the modernist way of thinking and a time when singular disciplines were studied in depth but not in relation to others (Farrelly, 2008, p. 39). This created a rigid static and over simplistic taxonomic structure of the world. Systems thinking helps people to see the multiple connections which link us all, it helps us ask "what if" questions about possible future behaviours, to understand the impact that our decisions have on us, and on our planet, and to be courageous about systems redesign (Meadows, 2008).

1.2 Diversity

Together-Repair initiates its research process as far away from "design" as possible. The starting point is problems that every single citizen understands: homelessness, food waste, women rights, asylum seekers; things and situations that affect our everyday life. Design is about choices but it is also a social science which focuses on the relationship between man

and the environment and each other. Design therefore is not only a social and environmental modifier but also a tool capable of revealing situations and developing awareness. American philosopher Sandra Harding in her book *Objectivity and Diversity* talks about the strong objectivity method and says: "In order to obtain more objective accounts of nature and social relations, researchers should start research from outside the dominant conceptual framework" (2015, p. 30). Dominant refers to those frameworks that mainly serve "the values and interests of the most powerful groups" (Harding, 2015, p. 34).

In *Together-Repair* starting research from outside the discipline means understanding the world in its diversity of thoughts and complexity: the world as systems of connections (Senge, 2006) and allowing the formation of a plethora of points of view especially when participants belong to economically, politically, and socially oppressed groups (Harding, 2015, p. 34). This is systems thinking which opposes the binary modernist thinking seeking a single truth. The diversity of thoughts, of components, and inputs into the design process therefore allows an expansion of the field of engagement and reports narratives from ordinary everyday life, from minorities, and from marginalized people. Design education is a social science and as such it must include the diversity of people. But "the social' tends to be perceived by philosophers and scientists as a source of obstacles and problems rather than as a generator of resources and promising new pathways" (Harding, 2015, p. 4). This must be changed if we want to teach the right thing in design. Objectivity and diversity for Sandra Harding are key instruments for any type of research, including design research. Science and objectivity are never views from nowhere, they are always socially and culturally embedded. "Sciences and their societies co-produce and co-constitute each other. There is no single, fixed meaning of the term objectivity" (Harding, 2015, p. 31). Objectivity is dynamic and as such it is historically positioned and socially constructed (Harding, 2015). Scientific research can be relinked with democratic social goals when different voices are part of the conversation (Harding, 2015). Diversity (in thoughts, in people, in situations) therefore becomes the first pillar of the course *Together-Repair*.

1.3 Engaged scholarship and place-based education

In the influential report: *Scholarship Reconsidered*, Carnegie Foundation president Ernest Boyer talks about the importance of engaged scholarship: "what we are faced with today is the need to clarify campus missions and relate the work of the academy more directly to the realities of contemporary life" (Boyer, 1990, p. 65). The scholarship of engagement is the second cornerstone for the course *Together-Repair*. It is about creating a dialogue between the academic and civic culture, it is about revealing and working with real conditions that are present in the Icelandic community. Boyer notes that:

> "university civic engagement is about much more than dissemination of research findings to different audiences. Rather, it requires a reformulation of research and teaching activities in ways that can bring different publics into the process of discovering and applying new knowledge" (Hambleton, 2015, p.297).

Since its start in 2014 *Together-Repair* has dealt with homelessness, food production, human rights, pedagogy, personal apathy, environmental risks, and mass tourism, to name just a few areas of concern. The course has shed light on important issues present in our community and delivered design outcomes to the public, to the media, and to the streets of Reykjavik. Students have engaged with pedestrians and workers, tourists, medical doctors, teachers, and other students elsewhere. This has created collaboration and co-creation of new knowledge. As Hambleton (2015) defines it:

> "the engaged university is rooted in the locality and makes a respected contribution as a place-based leader. It puts time and resources into the cultivation of a local civic culture that welcomes study, analysis and public learning. It supports research on and for the city, values community development and fosters action-oriented student learning" (2015, p. 297).

All these considerations are the foundation of the paradigm of engaged scholarship, and have been at the root of the course *Together-Repair*. Icelandic educator Ásthildur Jónsdóttir has been investigating and writing extensively on the meaning of sustainable education and states that:

> "The central point for a sustainable education is to become more conscious of places and to extend the notion of pedagogy and accountability to the concept of place. Place is the result of processes and practices. It is constructed by people doing things and in this sense, is never finished, but constantly performed" (2013, p. 90–105).

Jónsdóttir advocates for place-based education wherein teachers and students get a first hand experience of local life, which gives them the potential for understanding the political processes occurring and to engage with them meaningfully. Place-based education therefore becomes the third cornerstone of *Together-Repair.* This means involving the local community in the design project to promote civic knowledge, responsibility, and participation in individual and collective actions. Design therefore is political and as such it seeks to reveal issues of public concern (Jónsdóttir, 2013).

1.4 Collaboration

New Zealand architect and educator Tony van Raat writes in the foreword of the book titled *202 for Refugees* edited by Polish-French architect and educator Magdalena Garbarczyk, that:

> "The role of education should be to help the next generation of citizens to achieve awareness of their social and political responsibilities and to enable them to acquire both the skills and the attitudes to think independently and to make a difference" (Garbarczyk, 2016, p. 9).

We have tried to infuse this ethos in the foundation of the course *Together-Repair*. We believe that design is about making a change, a difference in our community, and possibly beyond. Design has to have the courage to reimage the system itself when needed (Meadows, 2008). Design is a research process and "It can be used as a tool to rethink everyday life, to transform ideas about industrial production, government, public and private space, pre-established systems and networks, and to generate new forms of activism, political consciousness, and community" (Faud-Luke, 25, p. 2009). A recent publication, edited by American visual communicator and educator Elizabeth Resnick titled *Developing Citizen Designers* includes a beautiful foreword written by Bernard Canniffe which states:

> "We have the choice to engage or not. We have the choice to act or walk away. If we do nothing then, sooner or later it will come knocking on our door, in one way or another, whether the knocking is from inside of us or from the outside actions resulting from the societal neglect" (Resnick, 2016, p. 8).

It is time to act and do it together. The emphasis of the course *Together-Repair* is based on the observation of our complex daily life. Students are asked to reveal contextual understanding of the issues that are dear to them, and to reflect upon them, their origins and causes, to interact with them and to humanize them by showing their ethico-aesthetic side, by introducing the element of subjectivity and consequently maturing the awareness and sense of responsibility to foster the ability to make the necessary choices (Persov et al, 2017). By doing so, students allow a necessary shift, which is from me to us, from individuality to community oriented, from owning to sharing, from linear mode of thinking to a systemic one. The American anthropologist, Janice Perlman stated:

> "We may have come this far through competition and survival of the fittest, but if we are to make the leap to a sustainable world for the centuries ahead, we will need to be intelligent enough to do it through collaboration and inclusion" (Perlman and O'Meara Sheehan, 2007, p. 190).

Collaboration therefore is the fourth cornerstone of *Together-Repair.* Collaboration is encouraged between academics, social workers, entrepreneurs, activists, and other local agents. Together we collaborate with the aim of using design as an instrument for social change, design as a tool to strive for new significances. Collaboration is a difficult art, based on negotiation skills, empathy, and understanding. As the British architectural firm MUF defines it:

> "Collaboration is not about different disciplines and personalities climbing into a blender and producing a consensus. Rather, it has to be the deliberate creation of a sufficiently generous atmosphere to make room for different disciplines and personalities... the haphazard search for an alternative to sharing and fighting over the same pencil." (MUF, 2001, p. 11).

In *Together-Repair*, we design new ways to engage and collaborate – first within the IAA – master's students, bachelor's students, tutors, and at the same time by establishing connections outside the school with local agents. Together we have reflected on the many imperfections present in our society, working to help people cast a new set of eyes on our own world which is more empathic to people´s needs and wishes, and shifts from egocentric to ecocentric.

2. Case: *Together-Repair*

2.1 Course structure

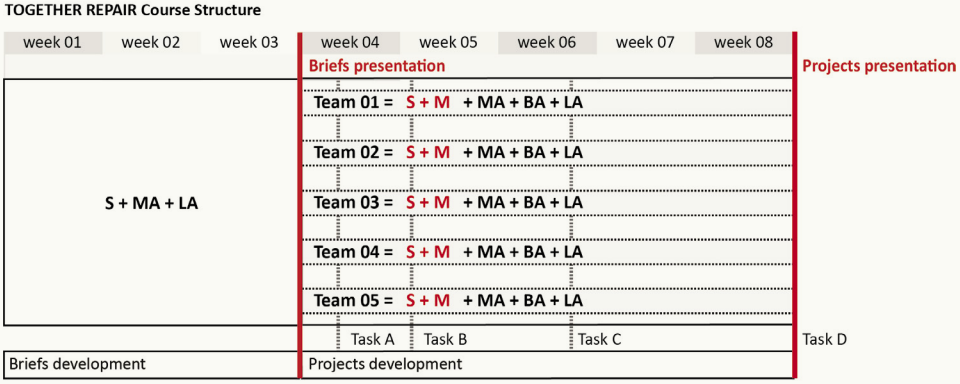
Together-Repair is a full-time design studio course that runs for eight weeks: five days a week (Monday to Friday from 13.00 to 17:00). It is difficult to identify the genesis of *Together-Repair* as it is part of the flow of learning that the MA design students experience during their two-year MA Design program at the IAA. By the time *Together-Repair* starts (usually the first Monday of April) the MA Design students have already spent seven months developing their personal interests through individual research and collaborative processes that integrate design workshops, theoretical classes and diverse field studies that bring students and otherness in close contact. The goal of the MA Design is to promote knowledge creation, and dialogue on design, through design practice and artistic research (Ísleifsdóttir, 2016).

The first three weeks of *Together-Repair* are characterized by extensive dialogues between first-year MA design students, the supervisor, mentors, and local agents, who are people in the community who have been selected by the master's students to support their project development. Dialogue as it is defined by Senge is: "the capacity of members of a team to suspend assumptions and enter a genuine 'thinking together'. To the Greeks dia-logos meant a free-flowing of meaning through a group allowing the group to discover insights not attainable individually" (2006, p. 10). We therefore talk about the world around us, verbalizing what we appreciate and what makes us uncomfortable: racism, sexism, ageism, militarism, xenophobia, homophobia, extractivism, and neoliberalism. All those ugly "isms" are discussed. We have a desire to undo injustice, and we reflect about the world by using our local community to then operate as design activists.

At the end of the three weeks each MA student (in 2016 there were 5) presents a brief which condenses the essence of their ongoing research project. Brief presentation takes place anonymously via an online platform. Each brief is accompanied by a title, an evocative image, and a 500-word text. All BA second-year students are then asked to read the online briefs and choose the one with which they wish to engage. By the beginning of the fourth week the teams are formed. Students work in transdisciplinary teams which aim at maximizing skills diversity by including a mixture of BA students in architecture, visual communication, product design, fashion, local agents, and one MA student in design who assumes the role of facilitator. Mentors and the supervisor assist all the teams. Teams do not have a fixed space within the school to work. Each team has to design its physical and conceptual platform of research, either nomadic or static or a mixture of the two. The supervisor and mentors sit in a dedicated lounge space and are available to the students daily between 13:00 and 17:00. Students decide themselves when to seek dialogue with mentors and the supervisor.

During the five weeks of the project development four tasks must be fulfilled. Task A: the design of one A1 poster intended as the main identifying visual representation of the project. Task B: the making of a 66 second video teaser about the project. Task C: the making of an object/event/system that is strongly connected to the project. Task D: a 180 second video narration of the entire project development and communication of the core message of the project. These four tasks represent conversational design tools to guarantee that all students participate in the course dialogue and to assure that the different projects are presented by using comparative design tools. At the end of the eight weeks the final presentation is staged in the main auditorium of the IAA. During the project presentation, a selected panel of social entrepreneurs, civil servants, private developers, designers, philanthropists, politicians, academics and business people are invited to assess the work of the students. The entire course is presented online. This allows for the immediate sharing of our process as it happens, and to maintain a link with the many international mentors who support the projects' development.

From 2013 to 2016 nineteen projects have been developed by 175 students from 22 countries (Austria, China, Ecuador, Finland, France, Germany, Guatemala, England, Iceland, Ireland, Italy, Korea, Lithuania, Mexico, Russia, Scotland, Sweden, Switzerland, Uruguay, Slovenia, the Netherlands, USA) with the help of 45 mentors from 7 different countries (France,



Iceland, Ireland, Italy, the Netherlands, the UK, and USA). Two of these projects have received a special prize from the president of the Republic of Iceland. Two have received funds for innovation and development.

2.2. The 2016 projects

Five projects were developed by 64 students from 9 countries with the help of 15 tutors from 5 different countries. Together we worked intensely for eight weeks trying to formulate different research topics. Each project addressed specific needs and each project used the power of design for the greater good of humankind. All the projects can be viewed online at: http://cargocollective.com/together_lhi.

Three projects were standouts: Intertwined, 91, and Trashed Treasures.

A. Intertwined

This project was developed in the context of an aging 21st century world, framed by the welfare system of Nordic societies. The specific case study took place in the city of Reykjavík with the aim of answering the question: Why are elders often separated from their families and grouped in specific health care institutions? The students involved concluded that the elderly are grouped and segregated and so are we! Our educational, working and welfare institutions with their increasingly controlled procedures, create borders that are difficult to traverse for the different generations. These borders are the origin of this particular apartheid. Therefore, rather than focus on a specific group in need, the problem became an intergenerational concern, demanding to be approached from a different perspective.

Ageism implies negative psychological, economic, political and even ecologic consequences for all citizens; at individual, familial and societal levels, signifying a bigger threat for future aging generations. Intertwined brings critical attention to the imperfect exclusionary system that often characterizes our societies. The growing gap between generations is a structural conflict that shouldn't be addressed as a problem to solve but rather one that transforms into a learning process. Facing this challenge of bringing the dissimilar generations together, students soon recognized that to enact repair, the first step should be reconciliation. Students were inspired to design a tool to transcend social asymmetries as a kick-starter of a bottom-up transformation. Samtól (Together-Tool) came to life as an experimental object, as a playful research artefact designed for listening to different voices, for sharing thoughts and common experiences with other generations. The Nordic knitting tradition crafted by sailors has been the inspiration for this simplified system of knitting through making knots which enables everyone to be a part of the game. Samtól has been a passport to start conversations. Dialogues between generations were established, games were played and diverse voices were intertwined together.

http://cargocollective.com/together_lhi/Samtvinna-Intertwined-2016

B. 91

This project addressed the circumstances of homelessness among women in the city of Reykjavik by showing how vulnerable and marginalized these people are in our society. The local agent of this project is the Women's Shelter Konukot, which was created in 2004 from a collaboration between the Icelandic Red Cross and Department of Welfare in Reykjavik. The shelter operates on confidential terms between volunteers and homeless women. Konukot reported that 91 women spent the night in the shelter during the year of 2015. The students' goal was to go beyond the number '91' and, as a result, students sought to tackle the issue from different design angles: the Konukot renovation, the flea market revamp, and organizing a photographic exhibition of images taken by homeless women using disposable cameras became the core of the project which culminated on the 7th of May 2016 with the reopening of the flea market. This event was a wonderful opportunity to bring people together, the neighbourhood and the people of Reykjavik, to raise awareness of the homeless women by crossing the border of ignorance, awkwardness, and avoidance.

http://cargocollective.com/together_lhi/91-2016

C. Trashed Treasures

This project deals with food waste in Iceland. It has been estimated that approximately one third of all food gets wasted. Students developed a campaign to increase public awareness. An exhibition was designed and built in front of three supermarkets in Reykjavik. Four minimal showcases were built and inside them, food found in supermarket dumpsters was displayed. The goal was to inform the public about the shocking amount of wasted food. By putting the food in an enclosed casing, students pointed out that although the food is in perfect condition, it is unreachable. This project made it into the national news and has been widely discussed in Iceland.

http://cargocollective.com/together_lhi/Trashed-Treasures-2016

Every course conducted at the IAA is subjected to the scrutiny of the students' online evaluation/feedback. 66% of the students who attended *Together-Repair* provided feedback rating the course higher than average in terms of satisfaction. Students are almost equally divided on the issue of "transdisciplinary challenge". Praised by half the respondents as an "eye opener" and "essential", and by the other half as discomforting. As supervisor of the course, I have received several personal emails from students in which they have described the experience of the course as: "life changing". One BA student writes:

> "Together-Repair has been one of those courses that really leaves a print in every student, as we all would be too shy or proud to admit it in public, but rest assured something definitely changed in every one of us after these amazing (and challenging) weeks".

An MA student who continued to work on her project by personally developing it writes: "I am a happier person, a better family member, and friend, and I feel successful in my job".

3. Conclusions

Design students need to engage in facing the current world crises: climate change, refugees, and inequalities. It is important to overcome the divisions created by modernist thinking towards new forms of collaborations. It is important to understand that "the problems in the real world do not divide themselves the way universities do" (Gharajedaghi, 2011, p.

104) and so a new relationship between the sciences, their philosophies, and their social orders must be developed. It is therefore fundamental for a scholar to reflect on how his/her research might contribute to the common good.

In *Together-Repair* diverse students (diversity) have learned to think in systems (to think in long-term actions, to consider the consequences of their design choices), to work with real issues (engaged-scholarship), to dialogue with their community (place-based education), and to work collaboratively. Through their engagement with real case studies, students learn to become guardians of our common interests and protectors of our environment. Designers are social agents, designers are political, and designers cross boundaries. Systems thinking is essential for understanding that we are all connected to each other.

Education is about awareness. It is about cultivating and developing not only scientific factual knowledge but empathy, emotional intelligence, social and design skills to face and solve the challenges. This can only be done correctly by involving diverse people: "diversity is, after all, the very source of true democracy" (Gropius, 1943, p. 13). In 1943 Walter Gropius reflecting on architectural education wrote a book called *Scope of Total Architecture* in which he stated, "our century has produced the expert type in millions; let us make way now for the men of vision" (Gropius, 1943, p. 13). That can happen only if the word "men" is defined in infinite, pluralistic, and diverse ways. Students have an innate ability to connect with each other to create platforms for dialogues. When students feel passionate about their project, disciplinary boundaries simply dissolve. But to break those boundaries students need to feel relevant – to feel that their effort is not only an academic exercise but has real impact to change people's lives. We believe that university is a platform for exploration and its goal should include the amelioration of people´s existence through social engagement.

Design is about choices and each choice has a consequence. Practitioners and educators in design and beyond need to be aware of such consequences especially when it comes to issues of global sustainability. Design has a social responsibility and a design decision corresponds to a consequence that goes "beyond" design, it is a social and environmental one, it affects our present and future generations.

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Massimo Santanicchia
Associate professor and program director in architecture at the Iceland Academy of the Arts and PhD Candidate in Cultural Studies at University of Iceland, Iceland
massimo@lhi.is

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The Ant Farm

Design strategy is made possible by social animals

Nathalie Savary, Samuel Accoceberry,
Nicolas Cucco, Morane Leuret

One for all, all for one

When we hear “ant farm”, the common image that comes to mind is this glass box made for budding entomologists in order to observe, live, the organization of the most social insect of all: ants. In his poetic essay on the life of ants, issued from his series of observations on the life of nature, Maurice Meaterlinck writes that: “the ant has remarkable liveliness, energy and health” and that “ants are totemists, they live for the collective soul of the tribe [...] There exists a true spirit of the anthill.” (Maeterlinck, 1930). These statements are exactly why, when I say “ant farm”, I picture my professional context, École Supérieure de Design de Troyes, where we observe a spirit of the school based on a singular collaborative dynamic between design students, teachers, professional designers and local industries & organizations.

Again in his essay *The life of the Ant*, Maeterlinck tells us that ants are social animals to the point that, like termites and bees, they possess a social organ that literally permits for an individual to nourish the ensemble. If we establish a parallel we could say that the human way for an individual to nourish the community, is sharing knowledge and experience; Spiritual nourishment. Moreover, collective intelligence and ingenuity, as fundamentals of innovation, design thinking and the practice of design, prove that only social animals, like the ants of the following tale (designers, craftsmen, entrepreneurs) can manage to develop a structured strategy in which the path of the individuals serve the whole and the evolution of the common project serves each participant.

1. La Villeneuve au Chêne: LVAC

1.1 Death and rebirth of a ceramic factory

In 2016, The Swiss group Geberit, European leader in the field of sanitary products, decided to relocate its production in Portugal and Poland, and to restructure the activities of his French subsidiary Allia. In September 2017, the company definitly closed the doors of the industrial site of La Villeneuve au Chêne (LVAC). They were putting an end to the production of sanitary ceramics present in the village for almost ninety years and putting out of a job a little more than eighty person. The photographer Raphaël Helle, native of the village, published a moving portfolio of workers portrait’s on Mediapart during the summer of 2017 and testified as such:

> “My mother began to work there at the age of 15 years old. Then, she made her older brother Régis, who had just returned from three years of war in Algeria, apply to the company. He was hired and spent his life in this factory [...] my cousin, Laurent, also joined the “Ceramic” at the age of 20. He is now 56 and today, in the region, companies close one after the other.” (Helle, 2017)

During that difficult period, when workers of the factory were fighting for their identity and their jobs, they rallied under the acronym LVAC as an assessment that their personal and professional story was imbedded with the territory. As an illustration of this, the acronym LVAC was also extended to La Voix Aux Céramistes (the voice of the ceramic makers), the internal paper edited by the workers. Their identity seems to have always been strongly tangled with the village. Abandoning the production site and the territorial anchorage was thus, for all, the greatest grief.

This local tragedy is indeed unfortunately common but gave a special resilience to a few former workers of the factory. Eager to revitalize the local production site, to sustain their skills and know-hows and to preserve their jobs, six irreducible decided to recover the industrial lab material, to invest a fraction of the thousands square feet of the facility and to launch the creation of a participative and cooperative company (Scop). The first ants of our story are thus Philippe Lorion, who worked as head



Adoration. © Raphaël Helle / Signatures.

of the firing process, repair and packaging at Allia since 1989, Ronald Rui, head technician, responsible for the ovens at Allia since 1995, Jean-Pierre Pesenti, lab technician at Allia for enamel preparation since 1987, Laurent Gaillard, enameller at Allia since 1981, Michaël and Angélique Mangeot, specialists in casting and finishes at Allia respectively since 1994 and 2006. The six of them account for numerous fields of expertise in the ceramic manufacturing process and a total of 150 years of artisanal and semi-industrial know-hows. They are the founders of the first collaborative dynamic of this tale and we will try to understand the entrepreneurial model they have chosen and the strong values it relies on.

1.2 What is a SCOP? Opportunities of collaborative transformation.

In a Scop, the employees are senior partners and fairly share power, risks, information and profits. The fundamental values of cooperatives are democracy, equality, equity and solidarity. The members of cooperatives embrace an ethic based on honesty, transparency, social responsibility and altruism. Moreover, the transformation of classic companies into Scop often rest on the will to preserve jobs where they were previously located. We find, in this definition of the fundamentals which underlie the constitution of a Scop, the concerns dear to the hearts of our previously presented irreducible ants.

The LVAC resumption project of the former sanitary ceramic manufacture into a Scop aims for the revival of the production tool through a democratic governance and community cooperation mode with distribution of profits allocated to the sustainability of jobs and of the corporate development plan. There is also a central concern in maintaining territorial anchoring. Such a collaborative transformation is at the origin of the renewal of relational configuration within the company, it's a process in which appear new manners to govern, manage and regulate the collective. In Maeterlinck's Life of the Ant, we can read the following regarding the organizational structure and the overall life of the anthill:

> "It should be considered as an individual who's cells, on the contrary of the approximately sixty trillion cells in the human body, would no longer be aggregated but separated, disseminated, exteriorized. These cells would nevertheless be submitted to the same central law, despite their apparent independence [...]

> What would be the name to give to this form of agreement and to the government which results from it? Is it a simple republic of reflexes? Is it, as we recently called it, an "organized anarchy" or a "cumulative community "? [...]
>
> An idea is adopted only when it seems relevant. There is no pre-established agreement, innate concert, but only in situ appreciation and judgement." (Maeterlinck, 1930).

The anthill organization has thus an empirical approach close to design methodology. It can also be a metaphore for the Scop inside of which the sustanability of the structure is a challenge based on individual empowerment at the service of the collective (becoming a partner, adopting cooperative attitude in the work, participating in the discussions...). Entrepreneurs-workers are actors and holders of the structure. Their human and financial investments make more sense and involve a spirit of commitment as well as a direct implication in the conduct of their activities.

We can clearly see that the Scop's sustainability relies on strong human resources expertise, entrepreneurship and management capacities and the ability to pursue numerous administrative steps. At this point of this ant farm tale, three new characters enter the picture: Michel Colombo, former plant manager, who is said to have "triggered the pump" for the project and still has today an important role of counselling and technical support. Delphine Bourgeois, human resources expert, who accompanied the whole transition of the social plan and took the responsibility of accompanying the "scopeurs" in all their administrative procedures. André Altenbach, grandson of the founder of the "Ceramic" in 1929, who decided to assure the presidency for the workers support committee. He brings to the cooperative his network and strong relations with the chamber of commerce. It has been mentioned in the research paper "Transformation powers of Scop: companies and territory.", that the implication of the management team from the previous company in the implementation of a Scop could be either facilitating or an obstacle. In the case of the future Scop of LVAC, we can clearly state that these three former managers are solid contributors and that their support in the project also testify that Allia facilitated this new collaborative initiative. They also were at the origin of the meeting between the scopeurs and École Supérieure de Design de Troyes. "We can truly say that André, Michel and Delphine are hatching us during the whole period of gestation of the Scop" (Philippe Lorion, future scopeur).

During the most heroic period of the life of ants – founding a new anthill – these three took the role of the nurturer that "patiently permits the laying of the first eggs, the emergence of the first larvae that will, later, as working ants, permit the development of the whole colony." (Maeterlinck, 1930)

Obviously, the team implicated in the future participative structure, was conscious that implication and values of equality and solidarity aren't the only elements at stake to assure the sustainability of a Scop. Again in "Transformation powers of Scop: companies and territory.", the autors say that there is a need to:

> "integrate the viability of the association and of the enterprise into a model of strategic analysis of the cooperative: combining transformative perspective (process of association) and competitive positioning (process of adaptation) [...] If the process of association has for main purpose the creation of a mobilizing project, the process of adaptation aims at the recurring identification of a positioning of market capable of generating autonomous income."

In the business plan developed by the team of the future Scop, they are planning in taking over a ceramic company – "La Céramique Loschoise" based in Indre-et-Loire and closing for cause of retirement – with the intention of buying off part of their equipment and relocating their activity at LVAC. The activity of that small artisanal factory is presently oriented on three different types of production: specific pieces for the Parisian underground, artefacts for the funeral industry and small series for design studios. In buying off this company, they are assuring the presence of a real order-book for the new Scop. Nevertheless, there are also conscious that it is important to launch a reflexion on the long-term for a potential order-book, in order to create new opportunities and address new markets. These craftsmen are no longer looking to position their activity only as manufacturers but also as editors and maybe including designers as partner-employees. They are longing, as the call for papers Together, to get there stated, to "stimulate collaborative practices to let innovation and unpredictability break free. (They) aim to get an outlook of the future, to get ideas (they) would have never had alone." Since this quotation could also define the motto of École Supérieure de Design de Troyes, introducing the local school of design in the gestation of the LVAC Scop project thus seemed the opportunity that this collective had to cease.

2. École Supérieure de Design de Troyes. Experimenting design strategy.

2.1 Collaborative projects and territorial dynamic.

In École Supérieure de Design de Troyes 2017 publication, "Notre design quotidien", a brochure presenting master student's diplomas, I wrote, as an introduction, this succinct manifesto:

> "Design is our daily bread.
> This formula expresses our concern about design which would be consumed in a vital yet usual way.
> Design which invades daily the hidden recesses of companies and, more widely, of our contemporary society.
> A practice which, without becoming common, has the duty to be regularly disseminated.
>
> Each day, every day ...
> A wholesome exercise." (Savary, 2017)

At École Supérieure de Design de Troyes, the director, Séverine Nomdedeu, insists on leading a mission of ambassadors for design in the Champagne-Ardenne territory. We regularly engage projects in which the school programs contribute to the development of local companies ranging from start-ups to small artisanal company as well as various industrials and public structures. We are intimately convinced that design is a factor of growth for companies as essential as marketing or research and development. Companies need complementary and transverse methods and approaches to exist, to make a difference, to develop, to create, to innovate, to enrich their offer and thus to increase their competitiveness.

In 2015, Igigabel T., Borja de Mozota, B., Picaud, P., & Rebours, C. published Design Impact, quand le design crée de la valeur pour l'entreprise, a census of French companies which gave the practice of design a key role in the growth of their structure. The synthesis they came up with, based on the series of detailed examples they gathered for their study, was that "the head management of a company can articulate a design intervention around one or several levers based on a vision (transverse strategy) of the organization and its fundamental objectives." They defined four main levers on which a design team can focus in order to bring unexpected experiences and improved usage for costumers, opti-

mized process of production and overall economic dynamic: “PROCESS (transformation and evolution of organization or productivity, optimization of working context, development of design culture)/ BRAND (Image and positioning, definition and management of visual communication)/ CUSTOMER RELATIONSHIP (customer journey and user experience, Interface with the brand, digital supports, physical spaces)/OFFER (addressing B to C or B to B markets, developing products, services, hardware, software, packaging...)”

Design is unmistakably a source of value creation, a lever for companies, even the smallest ones, and even more crucially in territories challenged in their economical dynamic. This observation is the spinal cord of the pedagogical approach for design we have at École Supérieure de Design de Troyes.

During the last Cumulus conference in Bengaluru, I was attempting to describe this school DNA based on collaboration with local TPE/PME, associations, territorial institutions and public services to Maurille Larivière, my peer at the Sustainable Design School in Nice. He listened carefully and concluded with this very accurate sentence: “the tiny work of ant that you perform is wonderful”. This tale is a wink towards his clever formula. I realised then that bit after bit, collaboration with small companies after collaboration with small associations we are creating a local awareness to design and its ability to accompany a more human-centered approach to innovation. We are slowly but collectively developing opportunities of reflexion for our students as well as local entrepreneurs. We are slowly but collectively bringing opportunities of new working frames, environments and challenges to young designers.

Amongst this overall objective of the school, this paper focuses on the singular context of applied design research in which our master students in design strategy construct their memoire and diploma project. This environment was developed through the work of my colleague Julien Robert, whose mission is to call out local structures and raise their awareness towards design impact, leading them to engage a one-to-one seven months collaboration with a student.

2.2 Master design strategy diplomas

Developed in partnership with a company, in close collaboration with the pedagogical team of our school, the master’s student diploma leans on collective implementation. The works issued from this program cannot be

possible without the synergy between the students, the pedagogical counsellors – all of them professional designers or design professors – and the whole environment of the partner company (CEO, R&D department, marketing department, human resources, experts of the different production units...)

The student's production is based on field analysis of the company's context and aspirations in order to collectively take perspective and begin an overall design recommendation. These recommendations are delivered to the school and the company in the form of a memoire and a project foreseeing new uses, anticipating needs and social evolution. Through an empathic approach, the objective is to identify the essence of the company, focus on its peculiarity and diagnose flaws and opportunities. In relation with the pursue or the development of the company's activity, student's co-define with the management team a brief that will allow to experiment and value the synergy between production processes, skills, ideas and new potential markets. The purpose is to launch an innovation process and disseminate design culture by demonstrating approaches disrupting the codes and logics established inside companies.

In our story, the two master's students who decided to collaborate with the future Scop of LVAC during the seven months development of their diploma are Nicolas Cucco and Morgane Leuret. In the perspective of presenting next spring, during the defense of their memoire and project, the fruits of their collaboration, Nicolas and Morane are currently accompanying the future scopeurs on process, brand and offer, three of the main levers defined by Design Impact, quand le design crée de la valeur pour l'entreprise.(Igigabel T., Borja de Mozota, B., Picaud, P. & Rebours, C.)

Nicolas & Morane's first encounters with the scopeurs essentially converged around defining the role of designers and distill design culture amongst their audience – which is a fundamental component of placing design at the heart of the future Scop's process. They also determined that for this new structure, branding (assessing values, image, discourse, logo) was strategically the first design implementation they had to define. Last but not least, as we already pointed-out, there was a necessity in developing a potential order-book for the Scop, therefore they also decided to work on the offer, developing new ceramic products that could participate in the global development strategy of the future structure.

3. Samuel Accoceberry. Opportunities of professional design networks.

3.1 Artistic direction

We were conscious that, if this collaboration between the design school resources and the Scop could lead to a good analysis of common opportunities, to the construction of a vision, to the definition of an identity and the creation of new products, it could not propel the emerging structure into a form of recognition. It was therefore important to construct an environment that could give visibility to the whole process.

École supérieure de design de Troyes had previously worked with designer Samuel Accoceberry. We were interested in his attachment to Pays Basque and the way he captures the territorial dynamic to engage in a long term reflexion with various local furniture companies. He also defines his practice of design by a particular interest in promoting know-hows and beautiful workmanship.

His presence as artistic director on the global project launched between the school and LVAC's Scop seemed therefore obvious. Moreover Samuel Accoceberry is regularly present in international design fairs and we collectively though that the participation in a Parisian international design showcase with this collaborative project would serve the perception of all participants; The Scop, by putting a spotlight on their new activity and making it identifiable amongst potential clients; Samuel Accoceberry, as a designer implicated in the dynamic of French know-hows as well as transmission to new generation of designers, École supérieure de design de Troyes in general and our two master's student in particular, by creating the opportunity to expose and communicate their everyday work on a national scale.

3.2 The workshop

In order to start a reflexion on the offer lever, it was decided between the Scop, the pedagogical team of the school, the artistic director and the two master's student's to focus on the marriage between design objects and the funeral industry. These two aspects of the heritage from the buy-off of "La Céramique Loschoise" offered fields of reflexion and experimentation around uses and behaviours where innovation would be welcome. A one week workshop called "Céramique & Funéraire", implicating all master's students of École supérieure de design de Troyes, directed by Samuel

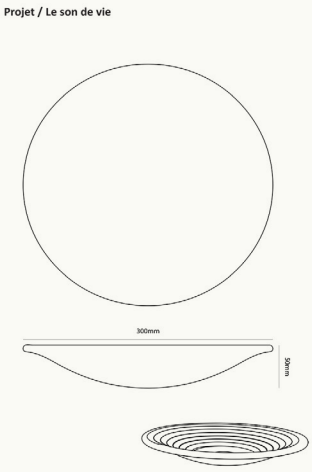


Presentation of workshop results. From left to right: Nicolas Cucco, Morane Leuret, Michel Colombo, Philippe Lorion, Angélique Mangeot, Michaël Mangeot, Nathalie Savary, Samuel Accocebery

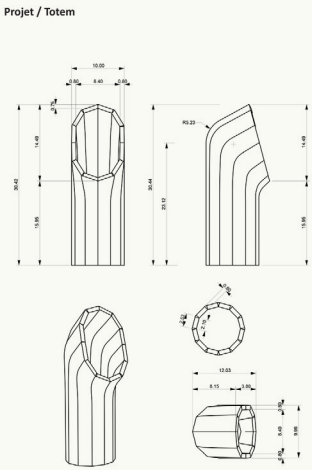
Accoceberry and myself, was organized. The idea was to gather numerous propositions around which Nicolas and Morane, propelled as project managers, could co-construct with their project tutor, the project artistic director and the scopeurs, their strategy on offer.

Several concepts issued from this workshop were selected for development and prototype testing. Le son de vie, 21gr, Mélodia, Totem, Thin Red Line... brought new perspectives on urns, reliquaries, cemeteries, colombarium but furthermore, on the relationship with the deceased, on rituals concerning the funeral ceremony and grief itself. This quick and dirty event lead to the emergence of objects that Nicolas and Morane are now co-developing in ceramic with the technical expertise of the Scop's craftsmen. Again the collaborative process and the participative dynamic of these protagonists are not without resonance with the back and forth incessant ballet of ant colonies in action. This Work In Progress accompanied with the brand image of the Scop will be showcased during next September Paris Design week.









Presentation of workshop results. Above: Le son de vie. Below: Totem

4. Credits in order of appearance

In the call for papers Cumulus Paris 2018, we could read under the theme Together, (re)acquaintance with actors?: “Productions stemming from design are rarely the work of a single person. While the credits of a film present an exhaustive list of all contributors, this is not the case with (design), fashion or even architectural projects, which nevertheless only emerge with the assistance of several professions.”

I therefore cannot resist in presenting the credits in order of appearance for the collaborative project described in this paper. The actors of design strategy. The organization around the making of design.

Philippe Lorion	member of the future Scop
Ronald Rui	member of the future Scop
Jean-Pierre Pesenti	member of the future Scop
Laurent Gaillard	member of the future Scop
Michaël Mangeot	member of the future Scop
Angélique Mangeot	member of the future Scop
Michel Colombo	ex-Allia plant manager, counsellor for the future Scop
Delphine Bourgeois	ex-Allia human resources, counsellor for the future Scop
André Altenbach	president of ex-Allia workers support group for La Céramique Loschoise / furnisher of appropriate production tools and order-book for the future Scop
Nathalie Savary	Pedagogical director of the project
Séverine Nomdedeu	director of École supérieure de design de Troyes
Julien Robert	responsable for the development of partnerships
Nicolas Cucco	Design Strategy Master's student-year 2
Morane Leuret	Design Strategy Master's student-year 2
Samuel Accoceberry	Artistic Director of the project

Design Strategy Master's students–year 1 & 2 /
participants in the Céramique & Funéraire workshop
Paris Design Week, International design showcase

All for one, one for all

I wanted to conclude on the actual quote from the Three Musketeers contrary to the wide-spread "one for all, all for one", in a will to reinforce what was said in the presentation of this paper: The ensemble allows each participant to search, to define himself and to evolve, all for one. But the one can also be considered as the project and it's an inescapable reality that we can only develop a design strategy if the management of the structure is convinced of the potential of design counselling and intervention, all for the one project. Togetherness is a necessity in the advent of design. What makes the collaboration narrated in this paper relevant was that the already collaborative model of management imbedded in the concept of Scop and of a design school facilitated the consciousness of collaborative processes, each and every person knowing they were there for all.

Nathalie Savary
Head of Design Department,
pedagogical coordinator,
École Supérieure de Design de Troyes,
France
nathalie.savary@get-mail.fr

Samuel Accoceberry
Designer

Nicolas Cucco
Master in Design Strategy student

Morane Leuret
Master in Design Strategy student

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New Models for Collaboration

Creating a Culture of Innovation in an Interdisciplinary Art & Design Studio

Austin Stewart, Ryan Clifford

Abstract

After multiple failed attempts at creating effective outreach and education materials for the agricultural practice of Integrated Pest Management (IPM), university research scientists and specialists in the field of Plant Pathology and Extension and Outreach approached the authors to develop an interdisciplinary collaboration focused on developing and deploying an innovative "moonshot" outreach and education campaign. As part of this collaboration, the authors provide resources and knowledge in design thinking, art and design studio practice, research, ideation, development, prototyping, and implementation of a comprehensive communication strategy.

IPM is a set of agricultural practices that provides economic benefit to farmers and reduces or eliminates the use of pesticides and herbicides; in short IPM is an important facet of sustainable agriculture. However, IPM has struggled to gain widespread acceptance and adoption by farmers and is virtually invisible to consumers. As art and design educators the authors saw the value of not only including, but giving primary authorship of the project, to an interdisciplinary group of undergraduate students. We hypothesized that giving primary authorship and responsibility to young designers and artists could lead to unexpected, effective, and innovative design outcomes while providing a unique educational experience for the students. Rather than prescribe or direct the students, we facilitated their design and research process by introducing resources, theory, and methods that emphasize a deep analysis of complex issues, articulation of key issues, and identifies the communication need as a starting point for their final design outcomes.

To realize this goal, we developed a year-long design process beginning with a novel sixteen-week interdisciplinary studio course focused on the development of a design proposal. The following semester is a paid experience for a subset of students in the studio course and is focused on the process of moving proposals to deliverables. This paper focuses on the studio experience as the paid experience is currently in process and thus we cannot report on final outcomes. In the studio, students were exposed to an immersive process in which they worked closely with the partners to research the topic and interview stakeholders; met innovative designers; and were exposed to disparate disciplines and methodologies (from

Systems Thinking to Thinking Wrong). Students were also involved in experiences outside the studio including field trips, lectures, and workshops with leading innovators in the field of art and design thinking. Through this process students generated the following question to guide their proposals: How can we use design methodologies and processes to build a culture of IPM? In response to this top-level question they identified specific design goals, strategies, tactics, and communication vehicles. At the end of the semester they presented their proposals to the partners and several IPM stakeholders who were impressed with and excited by the students' depth of understanding the challenges facing IPM and the comprehensive set of proposals they presented.

Theme: Innovation
Keywords: design thinking, interdisciplinarity, education, innovation, disruption

1. Introduction

Our home institution is a Land-Grant university. Part of the mission of Land Grant institutions, known as Extension, is to share the results of research from the institution with communities across the state. However, researchers across the university have been failing to effectively share the results of their research with the public and thus failing the mission of Extension. In response the Vice President of Extension and Outreach created an internal grant to supply funding to help develop effective methods for sharing research. The authors were approached by a Plant Pathologist and an Extension Youth Development Specialist who had spent 5 years trying to find an effective way to share their research and had multiple failures. Together we developed a proposal to create a model for developing and structuring pre-colligate STEM education and outreach materials. The scientist is the coordinator of the Integrated Pest Management (IPM) program, and thus we used his program as the test case.

1.1 Integrated Pest Management

Integrated Pest Management is a set of agricultural practices and principles that provides economic benefit to farmers and reduces or eliminates the use of pesticides and herbicides while requiring modest changes to

conventional agricultural practices; in short IPM is an important facet of sustainable agriculture. However, IPM has struggled to gain widespread acceptance and adoption by farmers and is virtually invisible to consumers. Though the grant proposal sought to strictly look at developing STEM materials from IPM, it quickly became clear through the research conducted by the students and through the immersion experiences in the studio that the larger issues with the adoption of IPM practices were an impediment to the development of STEM materials and could not be ignored.

1.2 The Model

The model we proposed is a unique curricular experience that is a collaboration between the researchers, design faculty (ourselves), and undergraduate students in the fields of art and design. As art and design educators the authors saw the value of not only including, but giving primary authorship and agency of the project, to an interdisciplinary group of undergraduate students. We hypothesized that giving primary authorship and responsibility to young designers and artists could lead to unexpected, effective, and innovative design outcomes while providing a unique educational experience for the students. Rather than prescribe or direct the students, we facilitated their design and research process by introducing resources, theory, and methods that emphasize a deep analysis of complex issues, articulation of key issues, and identifies the communication need as a starting point for their final design outcomes.

To implement this model, we wrote and developed a prototype experimental interdisciplinary course which was approved through our college as a senior-level undergraduate elective.

1.3 Original Contribution

Our original contribution is integrating a new model of interdisciplinary collaboration, where design and the sciences function as equal partners, into a design education setting. Conventional educational interdisciplinary collaborations follow a traditional client model where designers are hired to execute outcomes pre-determined by the clients. In our collaboration the partners bought into a design-led process-based methodology that began with the identification of the communication need. Students were enabled and encouraged to challenge preconceived notions of what the communication problem and outcomes should be.

1.4 Curricular Experience

The curricular experience is composed of two parts–a semester long studio course, and a semester of paid work experience refining and completing the ideas proposed at the end of the studio course. This paper will focus on the process and outcomes of the studio course as we have just begun the semester of paid work experience.

1.5 Student Intellectual Property

Iowa State University has a system for dealing with issues of student generated intellectual property. Though it is more obviously applied when a business external to ISU sponsors a studio course with the intention of taking ownership of the products of that course. In our case the work we are doing is for the university and a stipulation of the funding that we received is that the products generated are the intellectual property of the university. In either case there is a release form that students sign giving permission for their intellectual property to be transferred to the sponsor or university. This form does specify in what ways students are free to use the products of the studio.

2. Theory and Methodology

2.1 Novice and Expertise

Little research exists into the positive outcomes of novice-lead, complex problem solving, such as unexpected or innovative solutions to support our hypothesis. However, much research has been conducted examining the difference between experts and novices in complex problem-solving strategies. Experts, having solved similar problem types in the past, store solution templates and solve the problem directly while novices “blunder about searching for a solution” (VanLehn, p. 4). In many domains this blundering about impacts the quality of the answer and the speed with which it was generated (VanLehn). However, in many design methodologies blundering about (to some degree) is desirable as at different stages in the process as many possible solutions are generated in an attempt to produce innovative solutions. It could be argued that having a store of solution templates is antithetical to the goals of design processes and thus it is possible that novice-lead problem definition and solving could lead to more innovative solutions.

An important question in the development of this model is how best to leverage our expertise to achieve the best outcomes for the IPM program and for the educational experience of our students. Is it better for us to use our expertise to make the top-level design decisions, or to guide our students through the process we use to make those decisions? And, what are the impacts of student or novice-lead problem-solving? If there are negative outcomes can we use those as teaching moments leading to positive outcomes?

2.2 Curricular Methodology and Tools

In design education students are frequently supplied with a particular research question or problem and asked to find a discipline specific solution. Assignments like these are common in all of the institutions the authors have either taught at or attended. They are important to focus students' attention on learning the skills needed for their discipline, but we believe that they train young designers to consider problems through the narrow lens of their discipline. We seek to train students to consider the problem first and let their process guide them to the final design outcome which may or may not be specific to their discipline.

The course was taught as a process-based studio, in which the designed outcomes were not prescribed by the partners, but rather determined during the course of the semester through a series of design probes, exercises, and design thinking workshops. These led to the creation of a big question that the project must address, as well as the proposed strategic approach to this big question.

Students had authorship of the entire design process from discovering the challenges IPM faces, to creating a framing question for their design interventions, to developing and presenting prototypes to the partners, to delivering the final outcomes. While students drive the process we support that process by introducing design tools, methodologies, theories, and resources; and by providing appropriate feedback and critique.

Rather than focus the studio around one particular design methodology we wanted the pedagogy to mirror the varied tools and methods that we use in our creative practices. We have found through our practices that we rarely use a singular methodology or tool to solve a problem. Each methodology or tool has its strengths and weaknesses and will produce a particular kind of solution. However, when used in combination they can positively reinforce one another to reveal more poignant solutions than

any one alone. The methods and tools listed below are the most prominent that we included in the design process.

Design Thinking

Design Thinking is defined by the d. School at Stanford as "a methodology for innovation that combines creative and analytical approaches and requires collaboration across disciplines" (Chao, 2015, para. 10). This definition was valuable as we defined our process and intent for the studio course to our students and partners and served as a starting point for our problem identification and problem-solving process. We also referenced the model for Design Thinking utilized at Stanford's d.School, which establishes five phases or modes (An Intro to Design Thinking Process Guide (n.d.).

1. Empathize
2. Define
3. Ideate
4. Prototype
5. Test

This process offers potential for iteration and can be utilized in either a linear or non-linear process. In our studio in the Fall, the students focused on the first 4 modes, with the core group of designers working on the next phase of the project in Spring 2018 will be primarily utilizing the Prototype and Test modes, while also using what they learn from this process to engage again in the Ideate mode as they develop their final design solutions.

Thinking Wrong

A design thinking methodology developed by John Bielenberg, Thinking Wrong focuses on teaching designers' unique approaches to problem-solving to yield unexpected, innovative and successful design outcomes. The big idea for "Thinking Wrong" is the ability to break out of standard design orthodoxies to generate more effective design solutions.

> "In the creative process, designers are victims of their own synaptic connections; subconsciously we're following predictable pathways to solve problems [whereas] what you would want at the beginning of a design challenge is as many possibilities as you could imagine.

> ‘Thinking wrong’ is really about breaking those biases and synaptic pathways to generate a lot of potential solutions before you select and execute one.”
> John Bielenberg (Fell, para. 3)

Systems Thinking

Systems Thinking is a way of understanding and solving problems in complex systems. Systems Thinking stems from the understanding that all things are interconnected, that the whole is greater than the sum of its parts, and that systems feedback on themselves in positive and negative ways. Within systems are Leverage Points. “These are places within a complex system (a corporation, an economy, a living body, a city, an ecosystem) where a small shift in one thing can produce big changes in everything.” (Meadows) In *Leverage Points: Places to Intervene in a System* Meadows identifies a list of 12 points of intervention from the least effective (changes to the infrastructure of the system) to the most effective (changing rules, goals, and the paradigms from which the goals and rules emerge).

Students were also assigned the essay Solving for Pattern, by Wendell Berry, which uses an agricultural analogy to describe systems thinking and the challenge in identifying and addressing multiple levels of impact, intended and unintended, within in a system. This essay also provided a set of 14 critical standards when addressing complex systems, which can be applied to other contexts besides agriculture. This provided students with a clear articulation for how Berry defined a successful systems-based solution, in which he states: “A good solution solves more than one problem, and it does not make new problems.” (Berry, 1981. p. 5)

By understanding IPM as a complex system, students developed a clear understanding that in order to accomplish the goal of developing effective STEM education materials the challenges facing IPM needed to be considered holistically.

5 Whys

The 5 Whys is an iterative analysis tool that involves asking a chain of “why” questions to determine the root cause for a problem. It is a simple formulation of Root Cause Analysis (Rooney, et.al., 2004). The theory is that by asking a series of questions, by the fifth question, or “why”, you have identified the root cause of the problem you are addressing (Serrat,

2017). We asked to students to each go through the exercise of generating a series of "5 Whys", and from those exercises, the team began to develop the communication question that they were addressing for the project.

How Might We

Once the students had their outcomes from the "5 Whys" exercise, they undertook another round of sharing, posting, clustering, and distilling, and they then used the final root causes that they identified as an opportunity to derive insights, and to ask questions and investigate the topic further. Once they had done this, they began to work as a group to develop the final communication question for the project brief, or what big problem must their final proposals address.

This communication question was framed as a "How Might We" question, and was based on the research, immersion, partner discus-

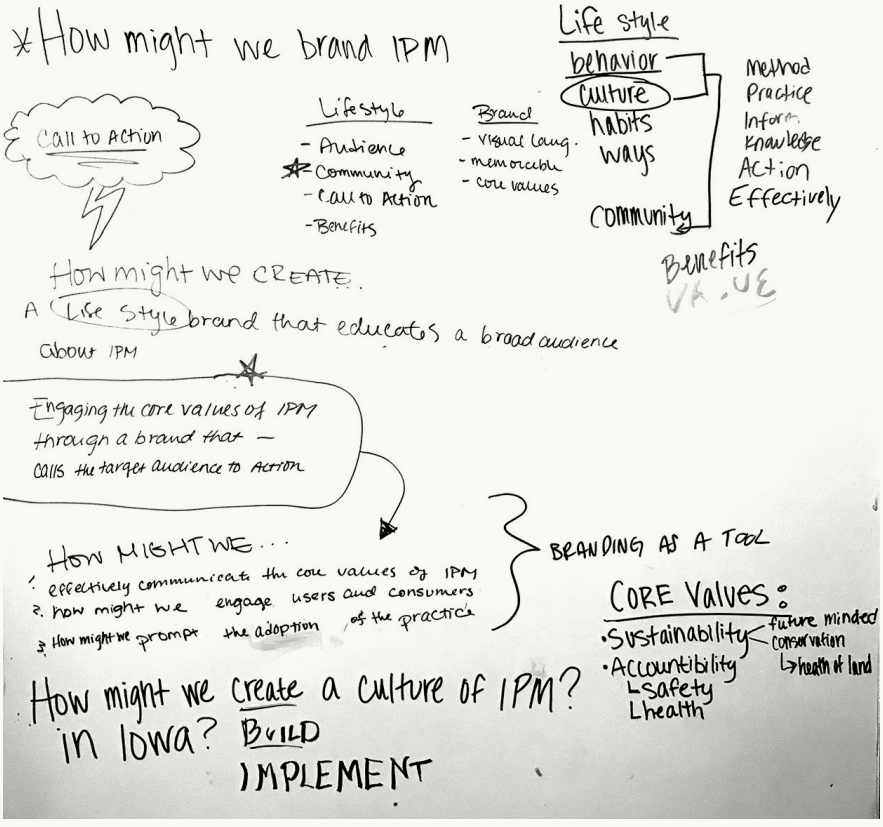


Figure 1. Brainstorming the "How Might We" question.

sions, and generative design thinking exercises ("How Might We Worksheet", n.d.). The students proposed evolving the initial communication question posed by the partners of increasing adoption of IPM in Iowa to "How Might We Create a Culture of IPM in Iowa (and beyond)?" This is an Iowa-centric approach, but addresses scalability, and the potential to use the materials created as a model for adoption of IPM in other states, and ultimately nationally.

3. Studio Experience

We treated the studio as a non-hierarchical design team. Rather than have small teams or individual students work in competition to one another they worked cooperatively throughout the entire process. In the end 10 students presented 5 proposals to our partners, with each proposal addressing a unique challenge identified through the design process. The studio course had 5 phases of inquiry: research, immersion, workshops, ideation, and prototyping.

3.1 Research

Though several students were children of farmers only one student had an idea of what IPM was before the start of the course. During the first three weeks of the semester, we facilitated their self-directed research as a deep dive into IPM and had them compile their findings (academic papers, web resources, etc.) and present those findings to the class. From their research outcomes we had them begin to build a cohesive definition of IPM and highlight some of the communication problems IPM faces.

3.2 Immersion

After the research phase students participated in several immersive experiences. IPM at Iowa State University and in Iowa has many stakeholders: researchers, farmers, farm CO-OPs, seed companies, chemical corporations, etc. We traveled to two sites and had a studio visit from Omar de Kok-Mercado, a soil scientist.

The Immersion phase of the project in which students interact directly with audience, stakeholders, and the subject they are investigating is directly related to phase one of the design thinking process, known as the empathize mode, as defined by the D. School at Stanford.

> "Observing what people do and how they interact with their environment gives you clues about what they think and feel. It also helps you learn about what they need. By watching people, you can capture physical manifestations of their experiences – what they do and say. This will allow you to infer the intangible meaning of those experiences in order to uncover insights. These insights give you direction to create innovative solutions. The best solutions come out of the best insights into human behavior." (Hasso Platner Institute of Design at Stanford)

One site visit was at the Field Extension Education Laboratory (FEEL), a research farm operated by Iowa State University and the IPM researchers. At FEEL the students were able to have first-hand experience with the practice of IPM and hear why IPM is critical for sustainable agriculture from the scientists' perspective. The research scientists at FEEL led the students in a field day outing which focused on the process of scouting crops for pests and disease. The field day was hands-on, and each student was able to learn through direct experience, guided by an expert. They were given nets and shown how to sweep soy beans to gather any pests. Once they completed the sweep, the researchers shared their findings by removing the insects from the sweep net and categorizing them one-by-one for the students. This led to a discussion of individual thresholds, and how the scouting process informs pesticide application. By utilizing this methodology, students learned that pesticide application is actually reduced because it is targeted, specific to the crop and field location, and to the insect and disease present.

By going through the actual process of scouting themselves instead of merely reading about it or having it described to them by the partners, the students were able make the connection to the value of targeted scouting and pesticide application. This experience was fundamental as inspiration for their final studio proposals and informed their suggestion of including experiential learning experiences as part of the final plan of work.

The second site was the Wright Farm, a family farm that implements IPM practices. In addition to the farmers, representatives from the CO-OP that supplied the Wright's with their seed and agricultural products (pesticides, fertilizers, etc.) were also present. The students learned about the benefits and challenges of IPM for farmers, engaged in a deep discussion about the economics of farming, and learned about the importance of the CO-OP in helping farmers practice IPM. They also learned how



Figure 2. Students scouting for pests and crop disease at FEEL.



Figure 3. Pests found in the crops by students at FEEL.



Figure 4. Evidence of disease discovered during crop scouting at FEEL.

technology is used in large scale agriculture and how advantageous those technologies are for practicing IPM.

A third experience was a studio visit from a soil scientist, Omar de Kok-Mercado, who gave a detailed presentation about the role and impact of soil in the IPM process. The soil scientist taught the students about the complex ecology that is soil, the importance of healthy soil to farming, and the damage done to soil through the over-application of agricultural chemicals and tilling.

Each of these immersive experiences left a strong impression on the students and allowed them to see varied and distinct perspectives



Figure 5. Students learn about the importance and benefits of IPM at the Wright Farm.



Figure 6. Examples of the screen-based tools used to track pesticide application in fields.

on the value of the IPM process, from farmer, to field researcher, to and soil scientist.

3.3 Workshop

Throughout the studio experience our intention was to offer multiple workshop experiences with professional artists and designers. Due to circumstances beyond our control we were only able to secure one workshop experience in the fall semester, but we have several experiences scheduled for Spring 2018. Barkley Design invited us to their Moonshot Lab in Kansas City to participate in a workshop on Design Thinking with a focus on user empathy, as well as have a conversation with Chief Idea Officer Tim Galles, Executive Design Director Paul Corrigan, and Experience Design Director Cady Bean-Smith. This experience was scheduled at the natural point of transition from research and immersion to ideation. The key takeaway for students was the idea of Big Design versus Little Design. Big Design uses design methods to develop strategies to solve hard problems, while Little Design uses design to develop effective vehicles to carry out that strategy. Barkley stressed that both were important for the success of a project.

3.4 Ideation

After weeks of research and immersion capped off by a design thinking workshop the students were anxious and ready to synthesize all of the information they had collected. However, they were not at the point of autonomy in their process that we desired–they were deferring to our expertise and overwhelmed by the information they had collected. To get them over the hump for the next couple of sessions we gave them one or two goals for the end of each session that would help distill the information and then we physically left the studio for most of the session returning near the end of the session to provide feedback.

These goals included:

- Identify Challenges
- Identify Studio Objectives
- Identify Key Messages
- Write an Essence Statement
- Write a research/framing question

To start the process of ideation we facilitated multiple in-class workshop sessions focused on design and problem-solving methodologies such as Thinking Wrong, the 5 Whys, as well as other brainstorming and ideation techniques such as mind mapping to identify effective points of intervention and potential design vehicles. At this phase, we asked the students to work in a generative and iterative manner, focusing on generating as many potential ideas as possible.

At this point we had the students compile what they had learned through their research and immersion experiences and present their findings to our partners. They presented on the challenges IPM faces, identified objectives for the studio, and identified pertinent key messages about IPM.

3.5 Prototyping

The final step in the process was to create prototypes based on their research to present to our partners and IPM stakeholders. For this step, students worked in teams of two, self-selected a challenge, and developed prototypes. Phase two of this studio experience in Spring 2018 will involve user and audience testing of the prototypes that the teams developed.

4. Studio Outcomes

4.1 Challenges

As they synthesized the outcomes of their research, immersion, and meetings with project partners and stakeholders, the team was encouraged to identify potential barriers to widespread adoption of IPM practices. These barriers or challenges would serve as a conceptual launch point as students developed proposals and strategies for addressing the communication issue. Students initially tackled this task individually, focusing on creating a generative list which included as many potential challenges as possible. Once done, the students met as a group, transferred their lists to post-it notes with each challenge on its own post-it. They shared their findings by posting the notes in the classroom and began the process of comparing what each of them had created, creating top-level categories and clustering similar findings, and then distilling these down to a specific and carefully chosen final list that represented

the most relevant potential challenges that they must address in the final design outcomes. Before being finalized, this proposed list of project challenges was tested and verified as valid and meaningful in the context of the project through discussion with the project partners and stakeholders.

From this process, one of the primary challenges that the students identified was the lack of a clear, understandable identity for Integrated Pest Management. There is a not a wide public understanding of what IPM is, the name and acronym are difficult to parse, and although composed of three recognizable words, the name itself does not offer insight into what the topic or approach actually is. This became an opportunity to explore potential naming and renaming strategies, which could culminate in an overall rebranding of IPM. This also provides the opportunity to explore ways to position IPM that clearly articulate what the subject matter is to a wide range of potential audiences, future adopters, and stakeholders.

The final challenges were:

- *Lack of awareness of IPM*. The acronym is unclear, and the actual terms are not illuminating in terms of what IPM is to a wide audience.
- *Lack of unified identity.* There is no existing "brand" for IPM.
- *Information is complex and unattractive*. It is hard to understand the process and value of IPM without expert guidance and assistance. There is a profound lack of materials that clearly articulate this information.
- *Information not easily accessible*. The information is complex, there is no hub or database of information for current or potential adopters to access.
- *Upfront costs are intimidating.* There is an initial investment required, a fear of failure, and the beneficial financial results are not immediate.
- *General public believes organic is the solution*. Organic farming is a well-known approach with high acceptance and demand, it is well-branded, messaged, and supported. IPM utilizes targeted pesticide use, and so cannot be classified as organic. However, Mark Bombford from the Yale Sustainable Food Program has suggested that a widespread practice of IPM would be better for the earth than organic agricultural production (Mendelson, 2017).

4.2 Key Messages

As the students developed their final proposals, they also identified a number of Key Messages, or attributes, that the proposals must address and reinforce for a successful outcome. These Key Messages are based on the challenges that they identified and are starting points that they can reference as they develop their campaign proposals.

- IPM is the holistic future of farming.
- IPM is not a "one size fits all" process
- IPM is a mindset
- IPM is a process not a product
- IPM is sustainable
- IPM is an investment
- IPM is profitable

The Key Messages served as way for the students to make certain that the proposals are well-thought out and positioned to address the big communication question in a successful manner. As the students developed the proposals, they were able to test them against these Key Messages by asking if the Key Messages are addressed in the proposed outcomes.

4.3 Proposals

To create a culture of IPM in Iowa, the ISU team presented a total of five main proposals. Each proposal reflected the key messages identified and addressed a specific audience. As the project continues in Spring 2018, the partners and stakeholders will work with the team to identify the final direction(s) to be prototyped, tested, and executed. Below are the three proposals that students have determined to be the primary areas of focus for the spring semester.

Approach 1. Moonshot

This proposal is an aspirational call to action to create an IPM movement within the state of Iowa with the goal of having 75% of farms practicing IPM by 2025. It includes a branding system, an inspirational statewide campaign, and a short film which used the poem *"Pioneers! Oh Pioneers!"* by Walt Whitman as an analogy to the space race of the 1960's to position rural America as the next great frontier. The other four approaches taken together are the launch pads for the moonshot campaign.



Figure 7. Moonshot Ground Control identity specifications.



Figure 8. Moonshot 75×25 billboard application.

AUDIENCE: Farmers, Consumers,
Agricultural Corporations
PROPOSED COMPONENTS

1. "Ground Control" identity system
2. Mission patches for participants
3. Pioneers! O Pioneers! Walt Whitman short film – a call to action
4. 75x25 Ad Campaign
5. Local and State government initiatives.

Approach 2. Pest Patrol

Pest Patrol focuses on providing experiential learning for children that allows them to engage with the principles of IPM in a fun, community-building way.

AUDIENCE: K-6, 4H and Future Farmers of America,
Extension and Outreach
PROPOSED COMPONENTS

1. Pest Patrol Identity system.
2. Pest Patrol achievement badge system.
3. Pest Patrol Merit Badge handbooks.
4. Pest Patrol Day camps, workshops, and immersive IPM scouting experiences.

Approach 3. Future Farms

The Future Farms proposal directly addresses the next generation of farmers and creates an immediate and recognizable visual system that clearly identifies IPM adopters.

AUDIENCE: The next generation of farmers:
elementary – high school students
PROPOSED COMPONENTS

1. Future Farms identity system.
2. Future Farms Signage and identifiers for adoptees increasing visibility and awareness IPM practice.
3. Future Mini-farms for immersive field trips and field day experiences.
4. Mobile Future Farms IPM Lab. This would allow Extension and Outreach to take their IPM message on the road to schools, camps, and communities.



Figure 9. Pest Patrol identity.



Figure 10. Pest Patrol merit badge application.

FUTURE FARMS

FUTURE FARMS

FUTURE FARMS
TOMORROW GROWS HERE

FUTURE FARMS

FUTURE FARMS

Figure 11. Future Farms identity.



Figure 12. Future Farms billboard application.

4.4 Partner and IPM Stakeholder Reception

The partners were impressed with how quickly students were able to engage with the subject matter and identify the challenges faced by IPM and arrive at a comprehensive set of proposals to address those challenges. The reception of the proposals was overwhelmingly positive with the partners becoming strong advocates for applying this process as a model for interdisciplinary work across the university. They specifically praised the idea of creating a culture of IPM, the breadth of and interconnected vision for the approaches, and how engaging the vehicles for those approaches were.

5. Conclusions

Acting as facilitators and giving primary authorship and responsibility to students led to unexpected, effective, and innovative design outcomes and provided a unique educational experience for the students. It required engaged student designers and artists who saw the value of a non-traditional studio experience in which they were given the responsibility of synthesizing, defining, and developing strategic approaches to complex real-world projects. Having instructors facilitate rather than direct their design process was initially challenging for our students. They were accustomed to being told what to do, how to do it, and what the next step should be. At first, we had to push them to take ownership of the process rather than receive direction from us. However, they soon gained confidence, took ownership, and gave themselves (and us) assignments. The highly positive response they received from stakeholders and our partners for their final proposals showed the success of the process and that novices both to design processes and IPM can be innovative and effective.

Having partners who were willing to step outside the boundaries of the traditional design for hire client model and commit resources to an unfamiliar process-based methodology focused on the communication issue, not the final design collateral, was crucial to the outcomes for the project and the learning outcomes for the students. Shared ownership of the project process and outcomes has led to the partners becoming strong advocates not only for this new model for collaboration, but for the model to be adopted as a prototype for future collaborations at the University level.

Our work has shown that it is possible to create a culture of innovation in an interdisciplinary design studio utilizing a collaborative model

in which educators, students, and professional partners work as equal partners, collaborators, and investigators.

6. Next Steps

From the proposals presented at the end of the studio course, a small team of five returning students will work with the partners to identify the primary direction moving forward for Spring 2018. The direction will be chosen through partner and audience input, and will include intensive prototyping, testing, working with audience and stakeholders to create focus groups, and creating additional prototypes and iterations based upon results of initial testing. The project will culminate in a final, executable strategic campaign proposal that the partner can then use to secure additional funding for executions and deployment of the campaign materials. In this second semester the team of students will be paid for their participation rather than earning credit.

We have two major goals:

- Short-Term goal: support the students in their work throughout the spring semester as they design and test prototypes with the audience and develop the final system of campaign deliverables.
- Long-Term goal: Use this model to start an interdisciplinary center at Iowa State.

Short-Term goal

Moving into the paid portion of the experience students will have the opportunity to tackle several challenges that were not fully resolved at the close of the fall semester such as the top-level rebranding of IPM. Tofacilitate the resolution of these challenges we are scheduling workshops, lectures, and other experiences with experts in the field such as Design Principle Eric Heiman of Volume Inc. In addition to rebranding IPM students will develop several of the proposed vehicles. As these are developed we will facilitate meetings with the specific stakeholders and audience for each proposal. At the end of the semester students will submit the completed designs and proofs to the partners.

Long-term Goal

Due to the enthusiastic partner reactions, positive studio outcomes, and feedback from our students about the experience we are interested in

continuing to offer a similar curricular and studio experience in the future. Our partners see the potential for this model to be of use to research teams and programs across the university and are setting up a meeting with the university administration to present our results and discuss next steps with the desire to create an ongoing interdisciplinary program or center based on this initial collaboration.

Austin Stewart
Assistant professor,
Art and Visual Culture,
Sustainable Environments,
Iowa State University, USA
astewart@iastate.edu

Ryan Clifford
Assistant professor,
Graphic Design,
Iowa State University, USA
ryanc1@iastate.edu

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A systems approach to design innovation

Kevin Walker

Abstract

How exactly can interdisciplinarity in the field of design be a lever for innovation? Where exactly might innovation be situated in interdisciplinary design? I address these questions by, first, de-constructing the terms 'design' and 'innovation' to expose their roots in science and art. I then identify patterns across science and art which can be applied to an expanded practice of interdisciplinary design, locating innovation in the connections between these disciplines. I then abstract these into design principles focused around practice-based research, providing illustrative case studies. The methodology for addressing the above questions draws from systems thinking combined with artistic research. Key findings emerging from our work include the construction of new ways of using and theorising information in design practice; the importance of embodied, multisensory experience in design processes and outcomes; and new methods of data collection and analysis combining multiple perspectives. These can roughly be grouped under a systems approach. The main contributions of this research are therefore in methodological innovation, and in an emerging set of design principles based on a systems approach.

Theme: Innovation
Keywords: systems, interdisciplinarity, art, science, fiction

1. Introduction

Interdisciplinary approaches in design education and practice are increasingly given and unquestioned, with 'design' and 'innovation' generally defined as generators of ideas, products, services and value. A broader cultural and historical view reveals important shifts in how these terms have changed, and thereby how critical perspectives are changing what design means and does.

Buchanan (1992) defines design as 'the conception & planning of the artificial'. It is no coincidence that 'art' is in the word 'artificial' – both are rooted in the Latin word related to making, skill and craftsmanship. But while the word 'art' typically refers to the making of something that somehow enriches human experience, 'artificial' usually describes the unnatural or even deceitful. Art is often counterposed against science, which investigates natural phenomena, while technology is typi-

cally associated with the artificial. Scientific and artistic approaches often serve as shorthand in people's minds and conversations for rational versus intuitive modes of thought, respectively.[11]

The terms 'design' and 'innovation' arose within American industry, in the 19th century, according to Noble (1977). America's founding thinker Benjamin Franklin regarded science as 'handmaiden to the arts'; a generation after him, the word 'technology' came into general usage to describe the application of science to 'the more conspicuous arts' (Ibid. p.2). At the time, according to Noble, scientists held little regard for practical applications or money making, and those in business conversely had little need for lofty scientific theories. But as both science and technology progressed over the 19th Century, a significant shift occurred in which companies increasingly adopted, or co-opted, scientific discoveries and techniques of the 'useful arts'. In particular, advances in electricity and chemistry were absorbed into corporate research and development, and engineering arose as a profession. Science itself became a form of capital – as Marx observed at the time, 'Invention then becomes a branch of business, and the application of science to immediate production aims at determining the inventions at the same time it solicits them' (Marx, 1858:592).

1.1 Innovation at scale

George Orwell and others saw the dangers of this marriage early in the 20th Century. In particular, wars large and small have tended to boost both technological and economic development (Ruttan, 2006). Conflicts such as wars serve as 'wicked problems' (Rittel and Webber, 1973) to be solved by rational minds and means, and design, as deliberate planning, is so applied to solve them (Buchanan, 1992). Technological tools such as computers – inherently rational by definition – both aid in and help to perpetuate this effort. Yet this results in what Lasch calls 'a productive system efficient in its details but supremely wasteful and irrational in its general tendency' (Lasch, 1977: xii–xiii). He notes, 'Unless accompanied by changes in social relations, technological changes tend to be absorbed into existing social structures; far from revolutionising society, they merely reinforce the existing distribution of power and privilege' (*Ibid*, xi). Mumford (1934) thereby preferred the term 'technics' to 'technology',

1 See Kahnemann (2011). Pirsig (1974) terms these 'classical' v. 'romantic' modes of thought.

which envelops technological innovation within the broader interplay of social relations, drawing from the Greek *tekhne*, which encompasses art, skill and dexterity.

In the Middle Ages, the individual craftsman held property, tools, and technical knowledge; all of these were gradually appropriated by capitalists through specialisation and automation.[2] Now, global industries rely on innovation as a variable, but inevitably run into the problem of scale: mass manufacturing and distribution shift the focus from quality to quantity, from individuality to commonality – of people, processes and products. An organisation, when it scales up, can no longer innovate from within, according to the designer Neville Brody (2016), and must import, purchase, or otherwise stimulate bottom-up creative processes.

But there is no conspiracy here. Jerome Weisner warned in the early 1970s that we were approaching Orwell's dark vision of *1984*, but that this was happening 'without specific overt decision or high-level support, and totally independent of malicious intent' (in French, 1979:6). This is the unintended result of collective human action – when individuals, acting in their own self-interest[3] or on increasingly specialised tasks, fail to see the big picture.[4] Following Lasch's argument above, we might observe that technological change is now so rapid that it serves primarily to reinforce existing distributions of power and privilege.

1.2 Questioning design and innovation

What then are the contemporary roles of 'design' and 'innovation', both of which emerged squarely within capitalism? Bratton (2016) proposes that many of our current global-scale problems are the product of the field of Design, and that 'the job of Design in the 21st century is to undo (much of) the Design of 20th.' Similarly, 'innovation', closely allied with design as a synonym for profit-making and exploitation, exists almost exclusively within narratives of technical improvement. Could it be

2 The early 20th century Arts & Crafts movement tried to address this alienation by giving control of the means of production back to the craftsperson. According to Morris: "Have no work in your house not useful or beautiful." Unfortunately, it was mostly the rich who could afford it.

3 Weisner later went on to establish the MIT Media Lab.

4 This view is most notably espoused by free-market economist Hayek (1991); for an account of how atomic scientists became increasingly specialised and failed to see the eventual outcome of their research, see Else (1981).

turned back against itself to question or design alternatives to 'artificial' products, services or experiences which might be viewed as harmful or exploitive to humans or other natural systems? When and how might the new become a reaction to newness itself?

Our approach is to confront the systems of design, technology and innovation by engaging directly with them, deconstructing them and using their own methods, tools and materials for alternate purposes. This aims to diverge from other critical approaches in its deep investigative approach involving direct engagement and practice; in moving beyond merely questioning and raising awareness to posing alternatives; and in our approach to interdisciplinarity – instead of drawing together teams of specialists to design something new, we aim to be and to train generalists who can work across a range of specialisms, tools, methods and media, drawing not from hybrid areas in the overlaps between disciplines, but rather from the far extremes of artistic and scientific research and practice, including, in our case, quantum physicists, children, nonhuman organisms or machines in the design process.

2. Related work

While much of the following work is grounded in critical theory, particularly around the deconstruction of texts, Marxist-inspired analyses of social relations, or social semiotics, I focus on practical implementations in art, design and technology, not theory.

2.1 Design & critique

Garland (1964) and fellow graphic designers critiqued the crass commercialism they saw in advertising, and called on designers to shift their priorities to more socially useful work. Papanek (1971) was even more direct:

> There are professions more harmful than industrial design, but only a very few of them. And possibly only one profession is phonier. Advertising design, in persuading people to buy things they don't need, with money they don't have, in order to impress others who don't care, is probably the phoniest field in existence today. (Papanek, 1971: ix)

Garland's manifesto was updated in 1999 and countersigned by a new generation of designers who hadn't seen much progress from the time of his original. In parallel, Dunne (1998) perhaps unwittingly updated Papanek's critique of industrial design for the digital age in coining the term 'critical design'. Dunne locates its roots in conceptual art and architecture as well as speculative fiction dating back to the 1940s, and it has involved primarily technology-related design concepts and prototypes to stimulate discourse and challenge prevailing assumptions. Its explicit focus on wicked problems, its liberal use of fiction and imagination, collaboration with scientists, and practice of bringing science into the art gallery has some parallels with our approach. Related approaches include Wodiczko's (1999) 'interrogative design', which uses 'critical vehicles' to question the role of the individual within capitalism; 'contestational design' (Hirsch, 2008) and 'adversarial design' (DiSalvo, 2010), both of which use the design of technologies to challenge political issues.

By comparison with the above approaches, we are less focused specifically on technology, politics or advertising, and more broadly on systems in general – both as targets for research and practice, and conversely as a general orientation to design. We focus on the real-world present, aimed at addressing systemic problems, existing and emerging power relations.

2.2 Systems & strategy

Systems thinking has long been integrated into design, being integral to any design project or process which goes beyond aesthetics or functionality with regard to a single product or outcome. Systems thinking began to be explicitly integrated in the 1960s by designers such as Papanek, Buckminster Fuller, and Christopher Alexander – all of whom came together in a seminal event in Helsinki in 1968. Helsinki Design Lab later shaped this into what they called 'strategic design', which aimed to move beyond the design of static solutions to the design of decision-making processes, by which the designer would be able to navigate, visualise and implement new relations.[5]

Blauvelt (2008) conceptualised 'relational design' as a performative, process-oriented and participatory practice, linked to the spread of digital

5 See http://1968.helsinkidesignlab.org (accessed 18 Mar 2018).

systems in the 1990s. Like strategic design, it charted a move from form to content to context. He cites Dunne and Raby (2013) as well as Bourriard (2002) whose identification of the move to 'relational aesthetics' in the art world was similarly influential in that domain. Systems were, as well, at the centre of Blauvelt's approach: '...the nature of design itself has broadened from giving form to discrete objects to the creation of systems and more open-ended frameworks for engagement: designs for making designs.'

Our approach is similarly concerned with systems and the relations between their parts and to other systems. Our work, however, is not commercially oriented as with Helsinki Design Lab, perhaps closer to Blauvelt's but with strong links to domains outside design.

2.3 Art & innovation

The art world has a long history of both interdisciplinarity and critical practice. Artists in the late 1950s began to work with emerging digital technologies, for example working with engineers and/or co-opting military computers for the purpose of making artworks (see Bedard, 2009). Conversely, artists including

Yoko Ono, Sol Lewitt and Bridget Riley adopted algorithmic or systems-oriented approaches to making non-digital works. The following two artistic examples are particularly relevant for us.

The Artist Placement Group, which operated from 1966 to 1979 in the UK, sought to relocate artists from the studio and into companies and government, for months or years – not to produce commissioned work but to offer insights such as a management consultant might. In return, the artist might gain access to new materials or produce documentation as new work. The APG had only a subtle form of critique, seeking to change the perception of artists as marginal figures by putting them directly in commercial contexts (Hudek and Sainsbury, 2012). Indeed, APG was criticised by other artists for being apolitical and even subservient to industry, and some APG artists even produced practical, commercial designs during their placements. This nonetheless has echoes in our work, in its regard for artistic knowledge as equally valid as other, seemingly more rational approaches; and in seeking to situate critical practice directly within real-world contexts. Two specific practices of the APG resonate with us: First, the artist was regarded as an 'incidental person' who explored and observed the context before making a proposal; and

second, the artist had an open brief in which they received a wage not tied to outputs.

Experiments in Art and Technology (E.A.T.) began in the US at the same time as APG, and united artists, engineers and scientists with the parallel aim of expanding the role of the artist in society through direct engagement with new technologies, in the scientific or commercial contexts in which technologies were being developed. E.A.T. is known primarily for '9 Evenings of Theatre and Engineering' in 1966, but its activities took place around the world, including India, Japan, El Salvador, Sweden and France. Such an international scope, and the bringing together of radically different practitioners, has echoes in our work.

2.4 Critical technology practice

Our work diverges from that of E.A.T. in that we engage directly with technologies as a critical practice more often than collaborating with engineers. This has roots in 'physical computing', which, as initiated by Igoe and O'Sullivan (2004), has made electronics accessible to artists. Viewed within the historical perspective detailed above, this locates innovation back in making and craftsmanship. This approach has been shaped into critique in approaches such as 'critical making' by Eric Paulos and others.[6] The open source movement further puts software and hardware specifications into anyone's hands, which also means that companies large and small are free to exploit them for profit.

Critical practice has more recently infused interaction design more broadly, for example in 'material speculation' (Wakkary et al, 2016) and recent research by Bonnie Nardi (2017, 2016). Dunne and Raby (2013) have explored a variety of possible futures with their students and collaborators, in their speculative design work around social engineering and synthetic biology. As computation is increasingly embedded in the physical world in the form of sensing, surveillance, connected objects, and the digital design of everything, some have begun to conceptualise a post-digital world (e.g., Berry and Dieter, 2015), including us. Our approach thus takes in current and future technologies but reaches more widely; I detail this next.[7]

6 See Hertz, G. (2012), http://make.berkeley.edu; http://www.paulos.net (accessed 18 Mar 2018)

7 See https://postdigitalfutures.tumblr.com (accessed 18 Mar 2018)

3. Our approach

We regard artistic research to be as valid as scientific research in generating new knowledge, and frame our contribution in terms of methodological innovation, aiming to redefine design and innovation in the context[8] of critical practice. Our methodology combines and conflates methods from art, design, journalism and the social and physical sciences. As such, we do not make firm distinctions between these fields nor between research and practice. We view ourselves, and aim to train our students as, research-based practitioners or practice-based researchers. Thus while focusing on the post-digital, we also regard our approach as post-disciplinary.

Our work can be divided into three more specialised initiatives. One, which we call 'de-computation,' has been described elsewhere (Walker and Fass, 2015), so this paper focuses on the other two, which have emerged more recently. (I note however that this paper is structured using the steps of de-computation: deconstruction, pattern recognition, abstraction and design.) All these initiatives are characterised by a strategic approach, which to us means going beyond the traditional definition of design as planning, to broader, longer-term thinking. A good strategy maintains some flexibility in the face of randomness and unpredictability, to turn a complex and developing set of affairs to particular advantage – this indeed is a definition of design (See Freedman, 2013).

But strategy is also art – the art of creating power. Thus, in contrast to the approach of Helsinki Design Lab, ours is more overtly political. An artistic strategy applied to design means interrogating and investigating systems of power and persuasion – how they embody, produce and perpetuate particular social and political relations and structures. 'If power was previously exerted in the disciplinary practices of design at a built and urban scale,' according to Ericson and Mazx (2011), 'power is shifting into the codes, programs and archives of telecommunications and network technologies.'

3.1 Systems Research Group

A systems perspective is explicitly investigated in our Systems Research Group, led by artist and quantum physicist Libby Heaney and grounded in scientific theories and methods. Information plays a prominent role, in

8 See https://midas.ioe.ac.uk (accessed 18 Mar 2018)

theories from Shannon's (1948) mathematical theory of communication to Integrated Information Theory (Tononi et al, 2016); and in practice as a material for artistic and design production.

Information is now seen to underlie biology, physics and chemistry as well as computation, and as a focal point it enables a redefinition of design from the perspective of natural systems. Dennett (2015) regards 'research and development' as a design process – as innovation which exploits information in the environment to create, maintain, and improve the design of things. This is undertaken by humans as a directed, top-down (strategic) process, but also by evolution as an undirected, bottom-up process. Viewed as a system, any organism or organisation is more powerful than any single element it contains, according to Weiner (1950).

Taking this view, what we refer to as things (microbes, companies, galaxies) are systems and processes – poetically and temporally-bound confluences of other things. Therefore instead of referring to discrete things, it makes more sense to think about how things connect with each other, of causes and effects. As in relational design as described above, meaning is found in the connections. According to Barad, 'Space and time are phenomenal, that is, they are intra-actively produced in the making of phenomena; neither space nor time exist as determinate givens outside of phenomena" (Barad, 2007, p. 383).

The natural tendency of any system, from the microscopic to the social to the galactic, is to eventually dissolve into entropy – the state where no patterns may be found. If all material and social entities are in a state of constant reconstitution and deterioration, we can hasten this process, or stop time by capturing a momentary glimpse of something – as in a drawing, photo or other representation – during this constant and inevitable transformation. This is a translation of time into space. Or, as with the strategic approach of Helsinki Design Lab or the Artist Placement Group, the process can be the outcome.

A critical perspective is elucidated by Heaney (2017), drawing from quantum information theory as well as literary studies: 'The act of critical reading means one must decide which questions to ask to probe certain inconsistencies and instabilities in a text.' This, she says, is not unlike a quantum experiment in which the act of observation biases the outcome one way or another. 'Deconstruction is not neutral,' according to Derrida (1981) 'It intervenes.'

Thus, observation is a key method with regard to systems, along with a recognition that observation can also influence the system under study.



Figure 1. A measurement problem of reality by Maria Euler (2017). Photo by Maria Euler.

Therefore, second-order cybernetics comes into play: developed by the social anthropologist Margaret Mead (1968) and others, this regards the subjective observer as part of the system under study. Zooming in and out to choose appropriate levels of description and action are therefore important.

The paradox about observation, from a quantum perspective, is that when an observation is made, it collapses the multiple possible states of a system into one. In *A measurement (problem) of reality*, our MA student Maria Euler, reacting to political events in 2016 (the US presidential election, and UK 'Brexit' vote) replicated a quantum experiment in which a laser is deflected in one of two directions, and encased it in a voting booth. The viewer (as active observer) pushes a button which randomly deflects the laser, thereby taking a measurement and initiating one reality over another (fig. 1). Euler worked with quantum physicists throughout her research, but attained sufficient knowledge of the topic to use and apply some of its core ideas as critical practice.

3.2 Investigative Design

Whereas a quantum approach views all observed phenomena as systems, we also use narrative methods to take a critical approach to systems. This is common in investigative journalism, which undertakes in-depth research to question systems of power and privilege, in order to produce stories which aim to inform and influence. While journalists typically strive to uncover facts, art (and arguably much of design) is often about fiction and fantasy. Yet both art and journalism are about making visible the things we take for granted. Both can inform, enlighten and provoke. Both can be overtly political. Both usually involve some amount of investigation or research, and result in some kind of output.

Some art embraces investigative approaches and the communication of facts. For example, the placement of artist Ian Breakwell in the UK's Department of Health and Social Security by the Artist Placement Group in 1976 uncovered substandard conditions in mental hospitals; his report was censored by the government, but the details later emerged in Breakwell's film works. Conversely, some journalism embraces elements of fiction, notably the 'new journalism' of Truman Capote and others.

In investigating a topic, both journalists and artists/designers typically recognise and embrace the fact that they are not experts. The journalist finds out whom to talk to, gathers multiple perspectives, digs into books and documents, but importantly does not get lost in research because there is a deadline to be met and a story to file. The artist/designer might also seek out experts as informants or collaborators, but pursues a singular, often critical, vision, perhaps turning a topic against itself or counterposing it against a completely different one. Our aim with investigative design is to bring together the best of journalistic investigation and artistic instigation, journalistic communication and artistic experimentation.

As in quantum theory, journalism embraces observation as a primary research method. Technology is similarly often used for observation and data collection – for example, cameras or other recording devices. Extended to computational practice, we can also use technologies such as sensors and algorithms to collect and interpret data in journalistic ways (see e.g. Bilton, 2013). The sub-field of data journalism attempts to look for stories in the data, not just collect data for a given story; we draw from this but aim for a broader range of storytelling mechanisms and outputs than printed or screen-based data visualisations.

As in quantum theory, journalism also embraces multiple perspectives, aiming for rigour and objectivity of methods while acknowledging



Figure 2. Their Voices by Sylvana Lautier (2017). Photo by Milan Lautier.

the subjectivity of interpretation. Design practice also uses multiple perspectives, for example at Helsinki Design Lab. While some practitioners of critique fail to go beyond raising awareness or criticism of the phenomenon under study, as detailed in (Walker, 2018) we aim for what Watson (2016) calls 'constructive criticism,' accepting that technology will not go away, and aiming to direct it to particular purposes through design. But investigative design aims at systems more generally, not just technological ones, as the following example illustrates.

To investigate the over-saturated topic of climate change, our MA student Sylvana Lautier interviewed London children about the topic and found them surprisingly positive about its perceived effects on their environment (for example, if London flooded, everyone could travel by boat). She then travelled to Greenland where melting ice was directly affecting local communities, and interviewed children there to create a film in which their voices tell the story. She exhibited this by projecting the film through a mirrored table, onto which viewers could manipulate a block of ice. The content was therefore communicated literally through melting ice, creating a visceral and multisensory means of telling the story (fig. 2).

4. Results & discussion

our approach to interdisciplinarity thereby combines methods from art, science and journalism to expand the realm of design beyond a top-down planning process, with innovation located in the connections between disparate elements, and newness emerging from their collision and the resulting divergent effects. Practitioners of this type of design aim to become generalists, but undertake deep subject-specific investigation, whether artistic, scientific, and/or journalistic, engaging with a wide range of collaborators who may or may not be specialists. We are just beginning to distill our findings into a set of design principles, but here are a few that are emerging:

4.1 Direct experience

A post-disciplinary designer aims to gain expert knowledge of a topic, and expertise in any domain comes not through the construction of abstract mental models but through direct, repeated experience, according to Sweller et al (1998). Drawing on scientific as well as journalistic practice, we have found that direct observation and participation in a given topic are the best ways to engage with and communicate it through design.

4.2 Constant questioning

I have described the practice of gathering diverse perspectives on a phenomenon. This means asking questions, starting with the journalistic conventions of who, what, why, when, where, how; it also means constantly questioning one's own assumptions and practices, recalling how second-order cybernetics situates the observer as part of the system. Here, such questioning becomes a key feedback mechanism for design.

4.3 Dialogue with(in) systems

What Meadows (1995) calls 'dancing with systems' means engaging in a dialogue with the materials and context of the phenomenon under study. A designer in this case should be prepared to cede some control and be led by the material and other human and nonhuman agents in the system. Choosing the right level of detail and description is important. We can distinguish between a level of descriptions (language) and that of actions (practice), following Laurillard (2002) who in turn draws from Pask (1976).

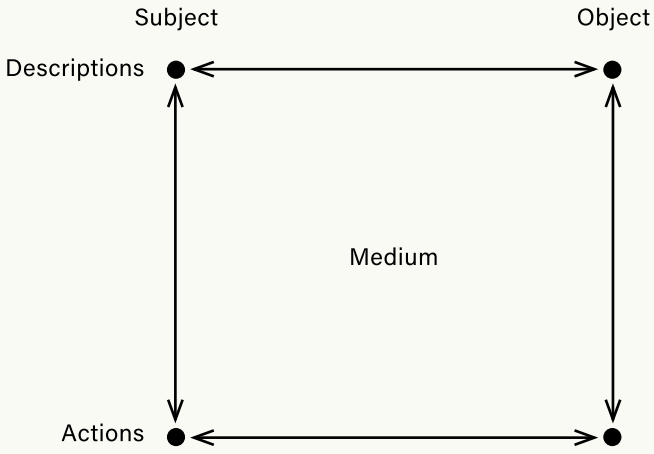


Figure 3. Conversational framework for design, adapted from Laurillard (2002).

A conversational framework for design, adapted from Laurillard's, is shown in Figure 3. This illustrates design as a system with a subject and object, with two-way feedback mechanisms (what Maturana (1997) calls recursive interactions, or what Barad (2007) calls 'intra-actions') occurring between them and on a level of descriptions (language) and actions. Feedback takes place not only between designer and audience on these levels, but also between the conceptions of the designer and his or her own actions, and the audience's conceptions and actions.

In a quantum system, the scientist as subjective observer would be placed on the left, and the object of study on the right, wherein observations are mediated by tools, which indeed are seen to influence the described outcome. An important difference between science and the arts, however, is that science observes existing phenomena in seeking objective truth, whereas art and design exists to create new things in seeking change – in an audience or in broader terms.[9]

Viewing the designer as subject and the audience as object, design can be located as a mediation between them, in the sense of a designed object or system; drawing a triangle between subject, object and medium links this approach with activity theory (see Kaptelinin, 2011). But the subject could alternately be the designer's audience, whereby the object

9 In quantum physics, a scientist observes a quantum system, situated in what is called a 'bath'. See for examplehttps://vimeo.com/95925128

becomes the object of their attention in a hermeneutic sense. Or, the subject could be the designer and the object as his or her object of study, mediated by cognitive and technological tools. Design can more broadly apply to the entire system, with the designer-as-subject being a part of it, and humans as natural systems being situated in a shared medium or environment.

In all these cases, the value of this model is in separating (but linking) language and action. Journalistic methods of interviews and observation can also be placed on these levels. As an example, analysing Sylvana Lautier's project about climate change detailed above, we can place her audience as subject and the topic of climate change as object of attention, whereby this attention is mediated by language (as feedback between the audience's conceptions about climate change and the language encountered in the film), and actions (for example tactile interactions with the ice block, or more broadly any subsequent actions they might take about climate change).

Taking a systems approach to design is not easy. Scientists train for years to acquire deep subject knowledge and rigorous methods. Investigative journalists cultivate sources for years and undertake deep investigations that are not always possible in design. Artistic experimentation with tools and materials can lead in unexpected directions. Similarly, taking a systems perspective means ceding some control and agency to the system, operating at different levels, and acknowledging the designer's subjective role within a system – not least the technological, social, political and economic systems we live in. But we feel that this is where innovation arises: in the connections and feedback between designer and audience, language and action, information and experience; and between disparate fields of study.

5. Conclusion

In this paper we have detailed a systems approach to design innovation – de-constructing each of these terms historically and across relevant fields; recognising and generating patterns in the form of our methodological approach to systems and narrative investigation; and we have begun to abstract our emerging findings into design principles. We hope to contribute new types of post-disciplinary practice with deeply informed practitioners drawing from the far reaches of relevant theory and practice in the social and physical sciences, conceptual art and design,

investigative journalism and communication. We thereby locate 'innovation' in the links between disparate areas of theory and practice, held together with a critical perspective and direct experience of materials and making.

The approaches we have described need further development and articulation. Each can be de-constructed further, and patterns recognised across them. The process of abstracting design principles from each can be extended, and formalised into a design process that maintains some rigour but also the flexibility of a sound strategy, and a critical perspective of constant questioning.

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Kevin Walker
Head of Programme,
Information Experience Design,
Royal College of Art, UK
kevin.walker@rca.ac.uk

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III. TOGETHER, THE LIFTING OF CONFLICTS?

Being together, doing together, is not just about conviviality and good humour, it is also about comparing oneself to others, to their ideas, their actions, their interests and it is about taking the risk of not always being on the same wavelength or about calling oneself into question. Collectivity is not always chosen, but if it is approached in an active and participative manner it can become a place of unexpected exchange of ideas, of skills and of creativity and it can make shared solutions emerge. How is design a good lever for action to escape what divides, opposes, excludes or oversteps these rationales of division, opposition and exclusion?

Who Decides?
Towards an ethical framework for instigating collaborative work

Leslie Becker

Abstract

If we engage an architect in the solution of a problem, we tend to see that resolution inhabit the form of a building. Problem complexity demands collaborations that often reveal long simmering biases from having been immersed within our respective design disciplines as silos have been reinforced from the time a design student chooses a major. When confronted by "others" our responses typically reveal that the particulars of our pedagogical influence have hardened our bias as we developed discipline-based competencies. Experiences with alternative, sometimes conflicting points of view vary, but more than superficial acknowledgement of difference is required. This paper focuses on the critical phase of assembling a team and establishing a space for ethical, productive interactions. While the broad view of collaboration is generally positive, within the group each discipline embodies a kind of traitor. Making evident this a priori tendency to analyze, speak, and act from bias is necessary as we attempt to reveal the potential for destructive conflict. When someone enters a group as a representative of a particular discipline, viewpoints may diverge. If we look at homelessness, the architect may want to design permanent shelter, the industrial or Ix designer interactive products that real-time guide the homeless to the nearest temporary shelter or medical service. The "traitor" emerges initially as whatever is not your disciplinary frame. If the architect engages in a collaborative process and the result is not a building, the architect is also an intra-disciplinary traitor. As we form groups to address complex issues, individuals cling to tacit but powerfully defended territory that can be made explicit and successfully managed by developing particular skills and by creating consciousness of how failure to acknowledge difference impacts the future work of the group. By focusing on the specifics of the initial structuring and composition of a group and the behaviours required to equitably inform the management of the dynamics of collaborative space, I am querying how a group is populated, what constitutes a valid participant, what behaviours must be learned, and what questions must be asked for work to succeed. By drawing upon a relevant but eclectic mix of theory and practice to inform a framework for working together, we must recognize the role of language competency, re-consider what constitutes rational thinking, acknowledge cultural difference, and learn to listen in order to minimize unproductive conflict.

An ethical framework needs to be established at the inception and guide our interactions during the full arc of collaborative work to minimize the group's tendency to be an on-going site of power relations. How we make hidden assumptions evident, what we need to know to begin our work, and who decides are central questions.

Theme: Conflicts
Keywords: ethics, conflict, traitor, framing, listening

1. Introduction

Conflict, not inherently negative, is often the source of productivity. However, recalcitrance is counterproductive and needs to be addressed when we begin work together. The central question in this paper is how to justly regulate the operation of power dynamics in the initial formation and definition phase of work within groups addressing complex problems. This power problem can be solved if we focus on some theoretical considerations about power and mastery of some basic individual and group skills in order to begin work. Intricate problems require the involvement of various, inherently biased disciplines to locate a solution that is well vetted and supported across the interest groups affected. Bias emerges from individual experiences and affects working together from the critical phase of determining who "belongs" in the group to managing difference. How we frame the moral positions we bring to complex situations reflects multiple influences: personal, social, situational, and pedagogical (Gula, 1997, pp. 51–64). The initial task is to alleviate and mitigate entrenched biases before the real work of the group can begin. By diminishing counterproductive friction we clear a space for inventive, collaborative work to assist designers, content experts, and the public in redressing persisting problems such as ecological assaults, product safety, graphic misrepresentations, gentrification and displacement at the urban scale. People may feel threatened, disenfranchised, or that core values are under attack. Learning to recognize the validity of points of view different from one's own requires a multi-pronged attack on our tacit conventions about how we get things done. The greatest impediment to progress is premature focus on outcomes.

2. Some theory as practice

Typically the group is assembled uncritically because the problem has been defined hastily. Preconceptions of what should be done often dominate while the first questions ought to be reflective: how, why, and by whom inclusion is determined. This is complex and somewhat non-linear. In striving towards pluralism and welcoming diverse stakeholders beyond those initially engaged with identifying that there is a problem, ideas regarding universal truths and Eurocentric ways of knowing need to be challenged. In 'Ontological Pluralism in Contested Cultural Landscapes,' Howitt and Suchet-Pearson attempt to unsettle a singular presiding point of view of knowledge systems, challenging existing systems, and changing how we think about stakeholders constituting a group that is more inclusive than the impulse of its instigating members. We might borrow the non-neutrality they ascribe to text to participants in a group (Howitt and Suchet-Pearson, 2003, p. 559). Non-neutrality, even in the face of claims of neutrality, tends to be the norm. It is evident among non-human primates that habitation within groups increases stress, largely due to alpha males grabbing power and maintaining control (Lustig, 2017, pp. 64–65). The following somewhat theoretical issues need to be brought to the table because if power is not fairly distributed early on, it becomes increasingly impossible to redress.

2.1 First we talk about how we talk

During formation of a group, behaviors for equitable communications are established. Once the ethics of group formation have been well managed, philosophical concerns for operational equity and inclusiveness help establish behaviors for communicating across differences. The theoretical underpinnings of this work derive from two methods of ethics, casuistry and communicative (or discourse) ethics. Casuistry, a case-based method of ethics, attempts to "interpret and resolve practical issues of the day" (Miller, 1996, pp.4–5). Casuists are skilled in making explicit what is at hand, measuring it against perceived moral requirements (not a universal category), and finding a "What is this like?" paradigm. Communicative ethics relies on deciphering "insights through participation in communicative or discursive exchanges" (Dallmayr, 1990, p. 2). Earlier iterations of what constitutes rational speech emerged from neo-Kantians such as Habermas who applied universalism to discourse ethics such that "Impartial judgment reflects a principle which requires that, in assessing inter-

ests, every participant must assume the perspective of *all others*" (Dallmayr, 1990, p. 8). More recent iterations of communicative ethics reveal questions that revisit what constitutes rational speech, what conditions define it, what constitutes normativity, and who should be at the table to decipher problems. This yields a more solid approach to managing the formation of the group and its participatory process for examining new ideas that span disciplines, but also anticipates related, future problems. Both methods are concerned with a practicality that is demanded of real-world problems, offering a hybrid method for enhancing participatory work, both qualitatively and experientially, and asking structural and philosophical questions.

Derived from Kant's categorical imperative (oversimplified here, to that which is rational and universalizable is moral), Frankfurt School philosopher Jürgen Habermas argued for discourse as a means to resolve complex issues. His ideas are particularly useful because he offers explicit and understandable 'rules' for participating in discourse. Interested in the development of competency in communication that would allow individuals to engage in rational discourse, Habermas claimed that it was "real argument (that) makes moral insight possible" (Habermas, 1990, p. 62). His conditions were based upon motivating the other actors to rational speech, rather than to influence.

2.2 Who talks?

Contemporary feminist philosopher Seyla Benhabib further refines communicative ethics and rejects ethical formalism by asking who gets to decide who should be heard. By providing a discursive space for those typically marginalized by the dictates of analytic philosophy, she situates argumentation as a replacement for Kantian universalizability (Benhabib, 1990, p. 331). Benhabib asks a different question: "Instead of asking what I as a single rational moral agent can intend or will to be a universal maxim for all without contradiction, the communicative ethicist asks: what principles of action can we all recognize or agree to as being valid if we engage in practical discourse of a mutual search for justification?" (Benhabib, 1990, p. 336). Her break with Habermas is a partial one, but is most distinctive in her understanding who meets the criteria to have a voice. She clearly interprets universalism in moral theory as constituting "equal worth and dignity" for all human beings (Benhabib, 1992, p. 185). Benhabib's philosophical critique of what he proposes tends towards

circularity, meaning, as she describes it, that the "normative content precedes the moral argument itself" (Benhabib, 1990, p. 338). Of course every deliberation must be seeded by something to which a group can begin to respond, something that typically is construed as normative. Communicative inclusiveness of various stakeholders requires the group to make explicit what it considers prevailing norms. What she is looking for as she rejects Habermas's notion of ideal speech is some form of agreement within a group resulting from a discursive form of argumentation. She requires us to "recognize the right of all beings capable of speech and action to be participants in the moral conversation… *universal moral respect*… and each has the same symmetrical rights to various speech acts, to initiate new topics, to ask for reflection …*egalitarian reciprocity*" (1990, p. 337). An overly fixed conceptualization of meaning, truth, and how competency of subjects is estimated is rigorously problematized. Rorty argues that intellectual and moral progress be more focused on the "increase in imaginative power" rather than the search for some truth (Rorty, 1999, p. 87). While the geography of meaning (where it resides) is worthy of further discussion, it is beyond the scope of this paper.

We need to learn to resist interpreting quick action as productive efficiency in order to engage the appropriate participants with the problem under investigation. As in an ethnographic study, one needs to observe from outside as well as to participate (Cranz, 2016, pp.46–47). Benhabib urges us to be aware of just how embedded biases can be because they affect not only who is listened to during the act of composing a group, but also once formed, how power (authority) is distributed across the group. In her discussion of Hegel in which she accepts that although he acknowledged that male and female roles were not naturally defined, he maintained, nevertheless, that men were action-oriented and effective in the public sphere while women were passive and effective in the private sphere (Benhabib 1992, pp. 246–247). This prejudicial dualism is often extended to other categories of ordering: race, religion, gender, earning power, level of education, title, etc. The question then becomes, do we *perform* this order once we are classified? The first question to be asked explicitly in order to suspend premature action is simply this: who needs to be sitting at this table and isn't?

2.3 What is the root of pre-judice?

Boulding defined conflict as both awareness of incompatibility and the wish to "occupy a position that is incompatible with the wishes of the other." When we are in the throws of conflict, we value order the positions (Boulding, 1962, pp. 5–6). The question incumbent upon us to ask is *who* is doing the ordering. Addressing the complexities of individual and group conflicts, he emphasizes the importance of symbolic power (Boulding, 1962, pp. 97–99). Simmel dissects the notion of hostility and points to two extremes – from one that defines an individual negatively in relation to another to one in which "both parties pursue an identical aim – such as the exploration of a scientific truth" (Simmel, 1955, p. 39). Conflict exists at multiple scales from individual to broad sociological and cultural ones. Emerging from postmodernity, more recent writings contest absolute notions of what constitutes right, potentially allowing for more conflict. Rorty references controversy at varying scales such as individual, family, others "...or when economic strain begins to split her community into warring classes, or when that community must come to terms with an alien community" (Rorty, 1999, p. 73). Writing about the process of (legal) arguing, attorney Gerry Spence notes that winning does not include only getting what one wants, it may include facilitating the other getting what they want (Spence,1995, p. 25). Dissenters, he asserts, argue not from weakness or a need to be right, but from conviction that should be seen as a mark of strength. It is a reasoned and principled position unlike those who argue from prejudice that, as Spence reminds us, has its root in "prejudgment" (Spence, 1995, p. 74). "*No matter how skillfully we may argue, we cannot win when the* Other *is asked to decide against his self-interest"* (Spence, 1995, p. 86). Courtroom-level verbal skills do not indicate a lack of validity of one's position, but merely a lack of courtroom-level verbal skills.

In an effort to resist the silencing or devaluing of particular people, political philosopher Iris Marion Young proposes the following.

> "First, I propose that we understand differences of culture, social perspective, or particularist commitment as resources to draw on for reaching understanding in democratic discussions rather than as divisions that must be overcome. Second, I propose an expanded conception of democratic communication. Greeting, rhetoric, and storytelling are forms of communication that in addition to argument contribute to political discussion." (Young, 1996, p. 120)

Young is, of course, arguing against an elitist centralizing of power within group discussion and expanding the value of different kinds of participants. Altruism, embracing the notion of a "greater good" and considering benefit to others, now is known to have a positive effect on brain chemistry (Lustig, 2017, p. 243).

2.4 We are all traitors

Despite the best collaborative intentions, each collaborator is a kind of traitor. Acknowledging this reveals the potential for destructive conflict. Once someone enters a group as a representative of a particular discipline, divergent viewpoints emerge. If we look at homelessness, the architect may want to design permanent shelter, the industrial or Ix designer interactive products that real-time guide the homeless to the nearest temporary shelter or medical service. The "enemy" emerges as *not* your disciplinary frame, evidenced by the architect engaged in a collaborative process in which the result is not a building. The architect then becomes an intra-disciplinary traitor as we each hold tightly to tacit, yet powerfully defended, territory. Borrowing from the historical analysis by Stanley Hoffmann, one can see collaboration as either serving the enemy or serving cooperation (Hofmann, 1968). Once committed to the work of the group, surely cooperation must be served even as the individual who relinquishes disciplinary bias is concurrently a traitor to her discipline.

2.5 "What should we do?" is the wrong question

Ask an architect to solve a problem and a building is typically offered as the solution. The training and working within a discipline build a powerful, tacit bias that is reflected in the language we use. A group, often defined through the use of words like aggregated, relatedness, and similar, is, as these words might suggest, a myopic entity. Although congruity provides a degree of efficiency, the failure to see alternatives to a commonly held point of view is potentially problematic, encouraging resistance to challenges. As sociologist and philosopher Georg Simmel noted, once we get beyond the initial unselected group that we think of as family, we tend to inhabit groups based upon "purpose, on factual considerations…on individual interests." (Simmel, 1955, p. 129) Groups may, once formalized, become sites of shared, unexamined assumptions. "When we believe that something is factually true or morally good, we also believe that another

person, similarly placed, should share our belief." (Harris, 2010, p. 14) We can imagine the deliberate act of choosing to join a group, but as alignment evolves, self-reflection narrows because we belong to a group presumably for reasons similar to others in that group, reinforcing intra-group affinities that are both powerful and somewhat unconscious. Special interests may result from particular relationships (such as familial) and challenge otherwise generally coherent values. If faced with having to choose to save one of several people equally in peril, we choose (as contemporary philosophy acknowledges) someone who has special relationship to us. Homogeneity may equate to *a priori* endorsement of a particular perspective, especially within affinity groups (religious, families, professional interests, etc.) as compared with more diverse groups *assembled* to address a problem. Affinity groups generally make sociological sense, with entrenched views and unchallenged values that reinforce thinking.

> "I want to argue that members of any community – it could be a family, a team, or a nation – may conceive goals and aspirations which, like their perception and beliefs, are intersubjective. The group or community exists or has a life of its own – it is not simply a logical aggregate – insofar as its members participate in these intersubjective intentions." (Sagoff, 1986, p. 313)

We do not think of some of our quotidian affinities as belonging to groups although often they have a strong coherence of values. We routinely listen, watch, and read that which reinforces pre-existing values and may yield to faulty reasoning. As neuroscientist Sam Harris notes, "...the inseparability of reason and emotion confirms that the validity of a belief cannot merely depend on the conviction felt by its adherents; it rests on the chains of evidence and argument that link it to reality" (Harris, 2010, pp. 126–127). This tendency is what is confronted here in the composition of the group and the ways in which it proceeds to work as we acknowledge that reproducing the expected should be problematized.

"What should we do?" encourages hasty solutions and is likely the result of designers trained to imagine some *thing* delivered by some *date*. This question invites assertive, defensive, unreflective, and occlusive responses because it forces us to retreat to what we already know. "What do we have here?" invites reflection, participation, and is the right Casuist question to create a climate receptive to discourse and able to resist the pressures of efficiency. The question itself is in the present and implies

postponing action. What are the multiple perceptions of the problem at hand? Can we anticipate future participants? What is the value of leaving parts of a decision suspended for a non-specific amount of time? "In telling ourselves and others the story of why we are pursuing a particular course of action, we weave a story or scenario that gathers events into a whole" (Betsworth 1990, p. 21). It may be that our self-deception, as Betsworth calls it, can only survive without opposition and contestation, limiting productivity when we come face to face with a competing narrative.

According to The Harvard Business Review,

> "Firms sometimes confuse operational speed (moving quickly) with strategic speed…In our study, higher-performing companies with strategic speed made alignment a priority. They became more open to ideas and discussion…And they allowed time to reflect and learn. By contrast, performance suffered at firms that moved fast all the time, focused too much on maximizing efficiency, stuck to tested methods, didn't foster employee collaboration, and weren't overly concerned about alignment." (Davis and Atkinson, HBR, May 2010)

Changing a question favors investigation and questioning over making premature assertions. Neo-Kantian philosopher Onora O'Neill pointed to the uselessness of the airlines industry following a crash as they looked to pinpoint blame (fiduciary implications) rather than investigate cause so crashes don't recur. She urges a shift from a culture of blame to a culture of investigation (O'Neill 2004).

3. Some individual skills to facilitate working equitably and effectively within groups

At the individual level, each participant should be expected to have a rudimentary mastery of certain skills to maintain power equity within the group process. Learning to listen, respecting linguistic difference, developing awareness of cultural dissonance, and mastering skills to deal with conflict are essential.

3.1 Acknowledge bias

If we reproduce certainty, we obscure options and lessen the likelihood that we can listen to opposing viewpoints. Seeing behaviors according to

classification as problematic and labels such as leader/follower or thinker/actor as limiting, Ian Hacking notes,

> "All our acts are under descriptions, and the acts that are depend, in a purely formal way, on the descriptions available to us. Moreover, classifications do not exist only in the empty space of language but in institutions, practices, material interactions with things and other people." (Hacking, 1999, pp. 31)

The role of authority and the willingness to have decisions imposed have been quite well covered by Herbert Simon who acknowledges the value of custom in accepting roles such as "employee" – though he does also admit that the power of authority shifts over time. Simon describes the willingness to accept authority as somewhat conditional upon the degree of sympathy of purpose (Simon, 1945, pp. 130–133). "Authority has been described as a relation that secures coordinated behavior in a group by subordinating the decisions of the individual to the communicated decisions of others" (Simon, 1945, p. 134). Behavioral shifts required of participants begin with the extremely important skill of listening. There are many ways, from the theoretical to the practical, in which to find value in conflict by looking at social situations and how that power is wielded to achieve an end, at organizational structures and how conflict is managed, and at legal notions of "winning" an argument.

Cultural biases run deep between East and West. In her discussion about "us" and "others," Benhabib asserts that we make false universal generalizations about our own Western civilization(s) as observers and then tend to project this universalism onto others (Benhabib, 2002, p.24). Acknowledging this complexity, patterns are still evident. An excellent example of East/West bias is provided by Alexander Stille's essay on the work of Italian conservationist Michael Cordaro who was invited by the Chinese to help with restoration. The basic principles of western art conservation appear to Eurocentrics to be entirely ignored in China, a culture that does not problematize varying degrees of copy and imitation (Stille, 2003, pp. 40–70). As Cordaro stated, "We call them fakes, but the Chinese have a different sense of the value of original and copy" (Stille, 2003, p40). As a Western professor who teaches several seminars each year, I have become increasingly aware of cultural differences as they manifest within a small group of students. I note at the beginning of the semester that a percentage of their grade is based upon participation in the semi-

nar discussion. This past year, when I was encouraging our increasingly large population of Asian students to participate more in discussions, a young man from China said, "We do not do this in China. It is a one way communication. The professor 'delivers' the information." This was a very important moment in the discussion, after which I acknowledged the difference but also that they chose to study in a western school.

3.2 Learn to listen

Van Jones, examining polarization in American politics that extends even to those with likeminded views, warns against confrontational tactics that so injure an internal group that their external work suffers. "Too many of us can deconstruct everything but can't reconstruct anything and make it work...Too many of us are great at opposition but awful at proposition" (Jones, 2017, p.54). Learning to listen while someone is talking and to actively suspend judgment is a critical moral skill according to philosopher Jacob Needleman. In his lecture, "Why Bother Listening to Opinions You Disagree With?" Needleman talks about what it means to listen. Restating in summary form what others who disagree with you have said is a basic act of personal morality, calling the "capacity to listen ... the first note in an octave that leads to another kind of action." He proposes the following exercise to develop this underdeveloped but immensely critical skill:

> "When two people passionately disagree on some serious question...you state your view about [x] and you state it succinctly. You respond with your view only *after* you have summed up her view. Once your summary is sufficiently accurate, she must be willing to say, 'that is an accurate statement of my view.'" And the two must be "merciless" until the summary is seen as fair. According to Needleman, people are waiting to win. "You must create a space in your mind to let the person into your mind – their views into your mind. And that's the beginning of morality...In order to listen like that you have to step back from your ego." (Needleman, 2007)

The result, he points out, is that you may still disagree – but you discover that the other person is a human being, limiting the disagreement to the idea and not the person. The most distinctive failure in not listening occurs precisely because we are actively preparing our rebuttal while someone else is speaking.

3.3 Consider linguistic style (yours and others)

Recent iterations of communicative ethics, influenced by feminist ethics, look at power and what constitutes rational discourse. The locus of meaning as strictly intrinsic to language has been challenged fairly rigorously in the writings of Derrida, evident in his caustic response to Searle in *Limited Inc.*, in which he challenges meaning as fixed (Derrida, 1988, pp. 1–23). As the pendulum has swung back from a deconstructionist extreme, one can reasonably assume that some part of meaning is intrinsic to specific language and other parts of meaning are extrinsic. Otherwise, all communications must be unstable, leading to a thoroughly dysfunctional world in which no messages are reliably processed. Within the communications of a group, however, lesser verbal abilities or less force to argue a position ought not diminish the value of *what* is being said.

Naming itself is an act of power, indicating that *what* you call something does matter, especially if your language is used as a descriptor in the future and becomes a self-reinforcing linguistic frame. Cognitive linguist George Lakoff points to the non-neutrality (power over others) of linguistic framing which can appear as accurate language or "spin" (which Lakoff describes as making something less than positive appear to be ok, but actually manipulates). Creating a linguistic frame and then having it reinforced even when those who oppose you use it actually reinforces your point of view. "Frames are the mental structures that allow human beings to understand reality – sometimes to create what we take to be reality" (Lakoff, 2006, p.25). Simon notes that *how* problems are represented matters:

> "... some of the general heuristics, or rules of thumb, that people use in making judgments have been compiled---heuristics that produce biases toward classifying situations according to their representativeness, or toward judging frequencies according to the availability of examples in memory, or toward interpretations warped by the way in which a problem has been framed... The way in which problems are represented has much to do with the quality of the solutions that are found." (Simon, 1986, p. 163)

Bourdieu expands our understanding of language and authority.

> "There is a rhetoric which characterizes all discourses of institution, that is to say, the official speech of the authorized spokesperson

> expressing himself in a solemn situation, with an authority whose limits are identical with the extent of delegation by the institution. The stylistic features which characterize the language of priests, teachers and, more generally, all institutions, like routinization, stereotyping and neutralization, all stem from the position occupied in a competitive field by these persons entrusted with delegated authority." (Bourdieu, 1982, p.109)

As a guide to better communication, one may ask oneself the following questions, "What am I trying to do with these words? For what purpose am I using them? And is any of them out of place?" (Wilson, 1956, p. 32)

> "Pride in speech is common throughout the world. Speech is widely recognized as the trait that uniquely distinguishes human beings from those who fall short of that stature. From this it follows that the more effortlessly and abundantly one is able to speak the more fully human one appears to be, Thus foreigners, because of their incomprehensible tongue, are viewed as less than fully human..." (Tuan, 1989, p. 63)

notes cultural geographer Yi-Fu Tuan as he observes how we evaluate those from other cultures on their ability to speak our language. An imbalance in power is reflected by linguistic competence and inherent in diverse access to education. It is incumbent upon us to make biases evident from the beginning of our work, and to consciously de-problematize them.

4. Conclusion

Reflectively situating the individual within the group, acknowledging individual biases (cultural and professional), and learning how to listen are the most critical tasks to form a viable group and begin effective work. Once these are addressed, conflicts are still inevitable even with multiple ways to manage ongoing conflicts available to us. Two examples, from among many, of managing conflict in groups are useful. Glide Memorial's Bridging the Divide project, based in San Francisco, provides practical information for addressing and creating a climate that allows for resolution of serious disagreements on issues like race, economics, and politics. "Our goal is to talk about divisive issues in a non-divisive way. Therefore,

we often talk about the most important issues facing our country and community. Topics in past meetings include the 2016 presidential election and healthcare." Participants agree to a set of behaviors that require listening, not interrupting, speaking with "I" statements, participating, being concise so all can speak, remaining open to exploration, avoiding inflammatory "trigger" language, not letting emotions escalate that result in devaluing others, asking questions, and keeping the confidentiality of the group. The goal of the project is to develop empathy and mitigate the tendency to avoid those with whom we disagree (https://www.glide.org/bridgingthedivide). These behaviors are useful for any group addressing difficult content.

Fishbowling, another technique to resolve conflict in groups, can be used if a group is large, seems hopelessly bifurcated on an issue, and members of a group are prepared to listen and understand the requirements of listening. The groups are divided into their two opposing viewpoints and, taking turns occupying speaking and listening positions, one group populates the inner speaking circle and the opposing group populates the outer listening circle with a moderator keeping the process orderly and summing up the discussion. With multiple iterations of the fishbowl technique, it is a useful method to resolve conflict, particularly for larger groups. As with all group work, it may be problematic for those not comfortable speaking in front of others (https://en.wikipedia.org/wiki/Fishbowl_(conversation).

Conflict in groups is manageable with the development of some theoretical awareness paired with pragmatic skills. The formative stage of a group must remain self-reflective, questioning, safe, and conscious of what may cause derailment of equitable and productive work. Because contemporary work cultures are so results driven, learning to suspend judgment and make a commitment to listening, though difficult, are necessary skills. Premature certainty is the enemy of good decision-making and thorough work. Conflict, while unsettling, is not immoral, but abuse of power most certainly is.

Leslie Becker
Professor Graphic Design and Visual Studies,
California College of the Arts,
lbecker@cca.edu

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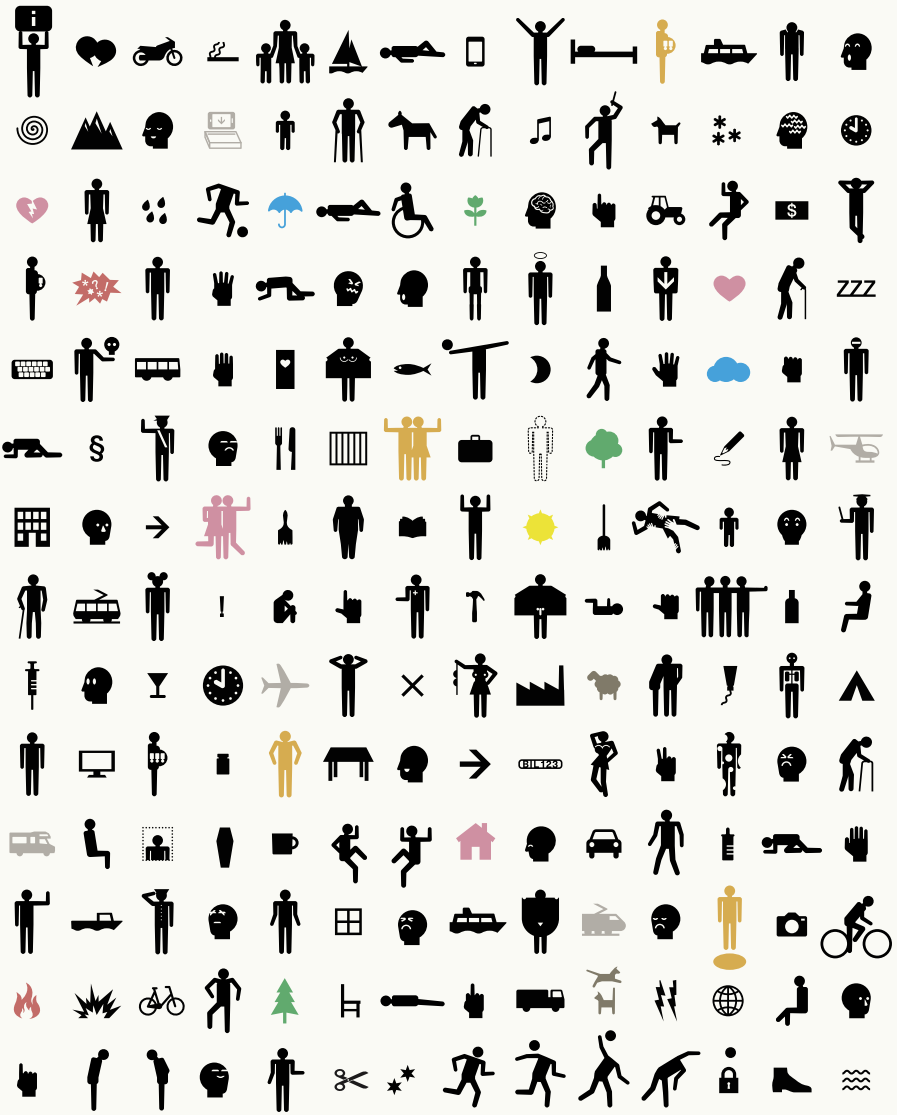
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A Pictographic Theatre When words exclude, pictograms include

Ashley Booth



Abstract

When words fall short, how can pictograms bridge the gap between people with different cultural and social backgrounds? How can we design visual tools enabling people with challenges to communicate their own stories? In our artistic research project Pictogram-me we investigate whether it is possible to use pictograms as tools for emotional dialogue.

Pictogram-me is an artistic research project developed at the University of Bergen, Faculty of Art, Music and Design and supported by the Norwegian Artistic Research Programme. The Pictogramme project aims to experiment and investigate whether pictograms, which are normally accepted as simple and not very flexible visual messages, can express more complex social messages. We aim to highlight the experiences of different groups who have a challenging existence. We have chosen these groups of people, who have especially complex daily lives, as our case because for them communication can represent an enormous social and emotional challenge. Researching and communicating their stories represents a challenge for designers, our aim is to encourage increased attention and empathy for those who have a difficult daily life. The project is based on research through design, which means that making is one of the most important methods when seeking new insight and experiences (Bergdorff 2006). In this project, we have cooperated with people with challenges, by visiting and interviewing them and their interest groups, if they have one, and collected their stories. We cannot claim to comprehend the diversity and the extent of the challenges some of us have. We can all feel underprivileged or have a difficult day, but we use 'people with challenges' as a generic term for individuals or groups of individuals who, for longer periods of time, face challenges in life and society. There can be many different types of challenges, related to being unemployed, in poverty, a victim of crime, a prostitute, an immigrant, a drug addict, elderly, a sexual deviant, or having lifestyle complaints, physical or sensory disabilities or being mentally challenged.

When giving something in return to our 'people with challenges' participants became our inspiration for seeking an ethically balanced dialogue, we focused on developing tools for visual dialogue to enable others to tell and communicate their own stories directly, and on tools to record their stories. Our experiments led to the development of the PictoTheatre.

Theme: Conflicts
Keywords: empathy, empowerment, pictograms, dialogue, visual tools

1. Why pictograms

The Pictogram-me[1] project is based upon design for social innovation and inspired by Isotype, a symbol system developed by Otto Neurath to explain and illustrate social and economic issues to the general public in the 1920's. His vision was: "Words divide, pictures unite" (Annik & Bruinsma 2010). One question explored in this project is whether Isotype's philosophy that every picture tells a story, can be revitalized using pictograms as tools for emotional dialogue.

Pictograms are normally accepted as simple and not very flexible visual messages, and often used because recognizing an image is easier than reading text (Norman 1988). We are surrounded by thousands of pictograms each day such as the friendly couple on the doors of public toilets, the icons on your smart phones and computers, and on weather maps and street signs. They are there to inform or warn, or sometimes just to be decorative.

Pictograms' popularity has been encouraged by their ability to transfer information across the borders of language effortlessly and impartially. But, pictograms are accepted as simple, fixed and universal visual messages that are designed for maximum functionality to convey information, not emotion. How then could the Pictogram-me project use pictograms to express more emotional and complex visual messages and create empathy?

In *Art and Visual Perception – A Psychology of the Creative Eye*, Rudolph Arnheim explains about the recognition of form "Simply put, the physical shape of an object is determined by its boundaries, like the rectangular edge of a piece of paper." (Arnheim, 1954, p.74). Scott McCloud talks about *amplification through simplification*, he pertains that people respond to cartoons as much as or more than a realistic image. The same could be said for pictograms. "By stripping down an image to its essential 'meaning' an artist can amplify that meaning in a way that realistic art can't." (McCloud, 1993, p.30).

Egyptians used orthogonal projection, because it was faster and easier for their minds to recognize. Also, Neurath was inspired by hieroglyphics as they made language pictorial and his development

1 The Pictogram-me project is published at the research catalogue (https://www.researchcatalogue.net/view/157238/157239) and has a Website: Pictogram-me.com, Instagram #Pictogram_me for interaction with the public. People can contribute by share personal drawings, or telling their stories by using the pictograms developed. They can also download pictograms and use for free.

of the pictogram standards in Isotype was influenced by their communicative clarity. Therefore, we summarize that pictograms, and their simple outlined forms, have the potential to communicate better than reality-true illustrations.

"With drawing, it is not uncommon for someone to put into pictures an experience or speechless terror that is difficult for him or her to put into words" (Talwar, 2007, p.26).

2. Process

At the start of the project in 2011–13 our initial tests gave us very limited results: Our students based their collection of data on posters announcing meeting places, invitations, project explanation cards, facilitating workshops with drawing tools for drawing together and interviews.[2]

There exists a lot of literature about how to collect various data focusing upon individual stories, and for example sociologists have developed methods of how to direct "life story interviews" (Dowling in Tiller 2004: 237–240, Wideberg in Album, Hansen and Widerberg 2010: 220–225). Different public organizations and universities has developed toolkits that addresses how to involve people from the initiation of a design project to its implementation, and share their methods and resources online.[3]

Nevertheless, it t was not easy to engage the participants in dialogue and sketching. When they were visiting the cafes and offices, where we chose to meet them, they were seeking a warm shelter and privacy and not dialogue with strangers. Our results were collected from observances and our own interpretation of another's situation, we realized that we had to look for other methods if we wanted to collect the more honest

2 The collection of material for the research project has been based upon the involvement of Visual Communication students at the academy became the Faculty of Art, Music and Design at the University of Bergen (until 2017 the Bergen Academy of Art and Design), and from workshops and exhibitions, and visitors and volunteers from our theme groups – people with challenges. Between 2011–2017 the project has held eight methodology and pictogram development courses, involving users through workshops and interviews, held two exhibitions – one of them including five workshops, one international seminar and over twenty presentations for design professionals.

3 See for example the free portal to the full Archive of Participatory Design Conference 1990–2016: http://pdcproceedings.org/index.thml and IDEOs Human-csentred Design Toolkit, https://www.ideo.com/post/design-kit

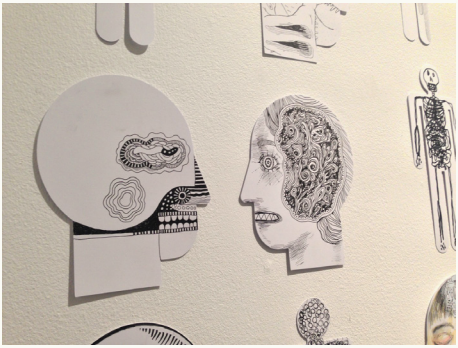


stories. We had to go out and meet them in their daily surroundings when they were not seeking food and comfort and we recognized the need to further develop our visual tools.

In 2014, we were impelled to change our focus from developing a tool to support our interviews – to creating a tool that would enable our theme groups to tell their stories themselves. The project based its further research upon Design for social innovation and Participatory design thinking.[4] These fields of design have their roots in action research, which is a form for research involving the participants in defining and solving problems. Empowerment of participants is essential, and is highly relevant when designing for empathy. Inclusive design and people-centred design processes are said to be effective as development processes, because users can play a leading role in defining issues and helping to focus direction, therefor there has been a shift from designing for users, to designing with users, where the user also becomes co-creator (Fuad-Luke

4 Already in the 1970s, the designer and educator Victor Papanek dealt with the social responsibility of designers, and in his well-known book Design for the Real World he proclaimed that designers should 'design for people's needs rather than their want' (Papanek, 1971, p.219).





2009, Eikhaug 2010). This shift has been paralleled with debates about the social dimensions of design. Even it appears that there is agreement on the ethical and practical advantages of participatory design approaches, the subject itself is also debated (Bjögvinsson, Ehn and Hillgren, 2012). In the Pictogram-me project participants became our Co-designers, [5]we included our participants both in the design of the new visual tools and in testing them.

The groups of people with challenges we have cooperated with are one group of elderly, two groups of homeless or beggars, several groups of drug-misusers or with earlier user experience, a group of refugees, and more recently people with dementia. We have also had the help and support of the Megafon Street magazine 2011, The Church City Mission 2011, Margit Tanners Remembrance home for the elderly 2012, Bakkegaten Care and Housing Community 2012, Arna Active 2015–16, Vartun Care and Housing Community 2015–6 and Bergen Clinics 2015–6.

Our dialogues with people with challenges have been based upon anonymity, trust and empathy. Stories have been told that affect us, but we have had no experience of unpleasant behaviour, quite the opposite, we have received only positive responses; especially our drug misusers and immigrants were thankful that someone wanted to hear and visualize their stories.

There have been ethical challenges in our research, especially in the way our meetings with our theme groups affected them. We experienced that some of the homeless we visited, over a period of some weeks,

5 In the mid-1940s the American psychologist Kurt Lewin (Lewin in Masters, 1995, p.1) argued that to understand and change social conditions, you needed to include those who know and live with the conditions.

looked forward to our visits. One gentleman started showering because he wanted to be more 'presentable' and another said he had never looked forward to talking so much. But what happened to them after our research time was over? We received so much from them; in return, we had shown our interest and concern, then to totally disappear after the project time was over.

Giving something in return to our participants also became our inspiration for seeking an ethically balanced dialogue. We focused on developing visual tools to enable others to tell and communicate their own stories directly, and on tools to record their stories. We tested apps, clay modelling, interpretive dance, image projections, kinetic pictograms tracking body movement, magnet pictograms, books to comment in, tablecloths to draw on, pictogram figures to play with, all with photo or print documentation amongst others. These experiments led to our developing the PictoTheatre which we will explain later as one of our 'results'.

3. Similar projects

Two examples of projects using pictograms to express statements and attitudes are Pussy Galore and Olympukes. In the 1995 Pussy Galore typeface was created by the Women's Design and Research Unit (Teal Triggs, Liz McQuiston, and Sian Cook). The pictograms were designed to help explore the roots of misconceptions about women inspired by the jargon of Western culture. Nine years later Olympukes, 52 satirical pictograms designed by Jonathan Barnbrook and Marcus McCallion, was developed as a comment on the commercialization of the Summer Olympics in 2004. These two reference projects were most relevant when we originally planned the Pictogram-me project, in that we the designers would visually translate our participants stories. But as the project developed we redirected our focus to investigating projects that enabled the participants themselves to tell their stories.

Blissymbolics were developed by Charles K. Bliss (1897–1985). Bliss originally wanted to create an easy-to-learn international auxiliary language to allow communication between people who do not speak the same language. They were conceived as an ideo – or pictographic writing system consisting of several hundred basic symbols, today over 4,000 symbols exist. In the 1970–80s Blissymbolics was used by people with severe difficulties in speaking to communicate without speech. It represented the start of 'augmentative and alternative communication'.

The organization ISAAC (International Society for Augmentative and Alternative Communication, founded in 1983) seeks to improve opportunities for people with serious communication difficulties. The organization works to promote research and development of alternative communication. In one case, they used pictograms to create a tool to help people to speak about difficult subjects, like violence. In 2012, they tested 29 pictograms to find out how people actually read them (Torgny and Kristensen, 2012, p.8, translated from Swedish). The organization divided the pictograms into three groups:

1. Images that are read directly
2. Images that are understood when they have been explained and linked to an already known concept.
3. Abstract images that must be learned

Visual tools have for many years been used to enhance conversation with children and with people with psychological challenges, and dolls have been used in conversations with children to address difficult subjects. There are many examples of picture languages and online resources, one, the KAT-box was originally developed in Denmark for children with Asperger's Syndrome in a collaboration between Dr. Tony Attwood, psychologist Kirsten Callesen and psychologist Annette Moller Nielsen. In this toolkit, you amongst other tools, find a kind of thermometer, divided into intervals from zero to ten, where the user can put faces and other visual symbols to judge the intensity of feelings, thoughts, experiences and interests in a concrete way.

Migrantas[6] are designers aiming to make visible the thoughts and feelings of those who have left their own country, using pictograms as a visual language of migrants. In 2014, we had the opportunity to arrange a workshop in Bergen with Migrantas. This workshop gave us new insights

6 Marula Di Como, a graphic artist and Florencia Young a graphic designer, migrated to Berlin from Buenos Aries in 2002 where they initiated the collective Migrantas in 2005. Migrantas's aim is to exhibit the thoughts and feelings of those of whom have left their homes and countries and moved to new homes and countries. Migrantas organizes workshops with migrants to reflect together on issues of migration. Migrants from very different national, cultural and social backgrounds, exchange their experiences and express these in drawings. Migrantas analyses the key elements and common themes from the drawings and translates these into pictograms. http://www.migrantas.org

as to what people themselves defined as challenges. Some of the drawings communicated feelings like loneliness, and these drawings were further developed into pictograms. The pictogram results were exhibited beside the original drawings in Bergen in 2014.

Unlike Migrantas we do not want to translate the drawings that the participants make into pictograms. We want the participants to visually tell the stories themselves, we are not making pictograms that tell stories – we are making pictograms to be used as tools to tell stories with.

To make our tools easy to understand and use, our pictograms had to be general and recognizable intuitively – we do not want to have to explain the pictograms (ISAACs *Group 1: Images that are read directly)* as you have to with Blissymbolics *(*ISAACs *Group 2 and 3)*. If we could minimize the number of pictograms to use in the tool then they would be easier to find quickly and not delay or halt the conversation. We believed that their simplicity could be an advantage for interpretation, seeing as they could have different meanings in different contexts – e.g. a syringe could symbolize medicine, or it could symbolize drugs, or it could symbolize small doses taken or given ...

Our project, as with the KAT-box project is that we juxtaposing pictograms to tell a story. Both projects are also designed as aids to help difficult conversations not to replace the conversation.



What is different with our project is that we use multiple images or pictograms in an illustration or together with other pictograms. A pictogram of a man becomes *me* – a pictogram of a woman *Mother* – add a heart and a house and the story becomes *me and my mother in our loving home*, and with a background of a sunny day the total picture is put into a context and symbolically strengthened.

4. Results

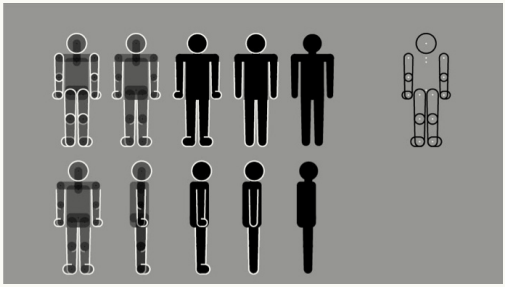
At one of our project exhibitions in Bergen in 2014 we presented a new digital tool we had designed, the 'PictoBooth'. The PictoBooth is the equivalent of a Photo Booth; using Kinect technology[7], your body language and gestures are registered and translated into real live pictograms. With a countdown time to freeze your own pictogram with a chosen title and the PictoBooth automatically prints a copy for you. It encourages participants to act and pose to make their own pictograms, the intent was to be a co-creator of pictograms, and to raise self-awareness of body language. At the exhibition, it received much attention. We reflected that by using visual aids as captivation and entertainment, they were an ice-breaker to attract people to participate in storytelling. And that it gave us the possibility to give something in return: to tell stories on screen and get an immediate printout.

We had already experienced the challenge of working with people with varying 'daily form', who were most difficult to make appointments with and to facilitate workshops for. And as we had realized that we had to go out and meet our theme groups in their milieu, we planned to further develop the PictoBooth to be a physically moveable tool with additional pictograms that you could drag and drop into the main picture to encourage more complex storytelling. But, in the meantime in 2015, we developed another tool: The PictoTheatre.

Two separate occurrences were a breakthrough for the project and led to the invention of the PictoTheatre. Firstly, that we were contacted by Bergen clinics, who invited us to contribute at a conference about drug related care. Months before the conference, we met representatives from the Bergen Clinics and other related organisations, to discuss the possi-

7 Kinect is a live motion sensing input device released for programmers by Microsoft in 2011, it is a user interface that can use gestures as commands as the Kinect technology recognizes the physical points and joints on the body.

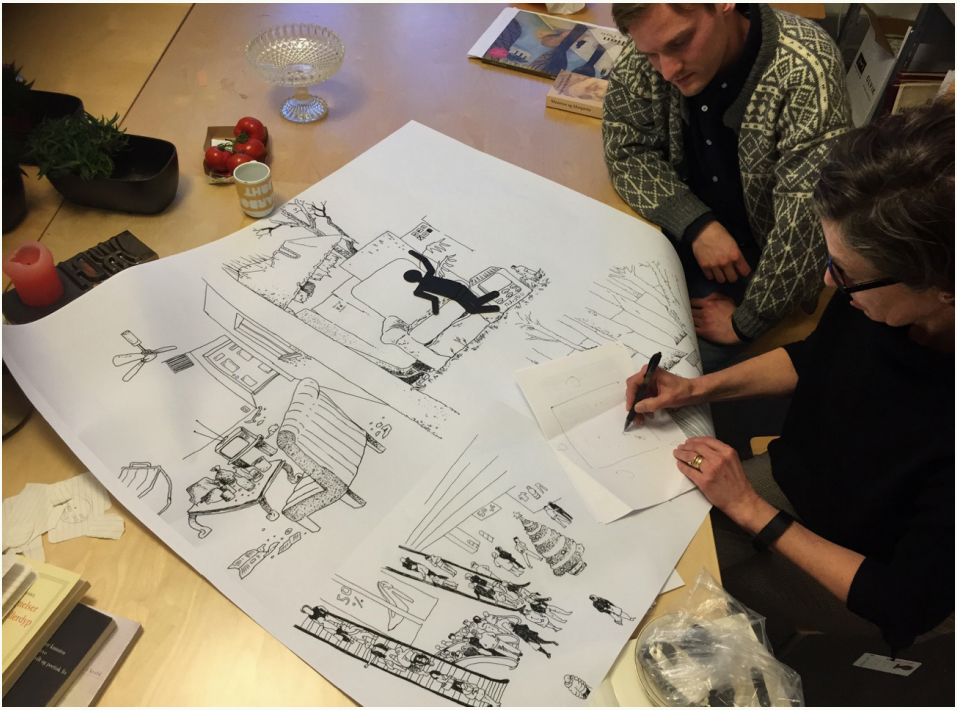






bility of testing pictographic tools in drug related care. In the meeting, we discussed how spoken or written language could make the user feel excluded, and how a formal bureaucratic language could make them feel like outsiders. We concluded that it was important to develop a visual language, so that when invited to a dialogue with dignity and respect the users could feel equal and competent.

The Bergen Clinics' needs were parallel to our projects aims, and therefore we could test tools with them. After the meeting, we were reminded of a book one of the participants showed us, a fiction book, with personal photos and notes added, made as a gift for a child whose mother had passed away. The book was made to help the child keep memories of




(4)
PHILIPS

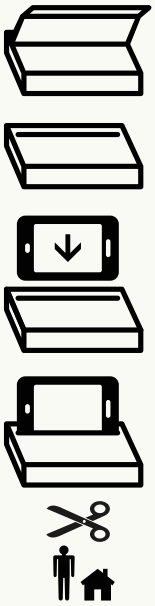
her/his mother and to be reminded of her positive qualities. How can you use an existing story and introduce visual information to it to tell a person's life story? We had an idea for an exhibition, 'The books we read', we also designed tablecloths illustrated with urban and rural scenes. By placing pictograms into the scenes, they became actors for telling stories and tools for conversations.

After we had made prototypes to test these ideas, we discovered that although you can learn a lot about another person by having a conversation about the books they read, we also experienced that the participants were intimidated. Some were shy because they preferred to read comics, for others it reminded them of the problems of doing homework. The tablecloths worked as a good conversation starter, but the results and the stories felt rather flat and two dimensional. The tablecloths also introduced us to the idea of using cut-out pictograms as 'actors', not only as moveable human figures but, also as support pictograms, houses, beds, hearts, rain, feelings, nature...

It was important for us that the pictograms we developed as conservation tools were in what ISAAC calls its *Group 1: Images that are read directly*. We made a collection of pictograms where the design of the human figures is based upon Kinect technology. By utilizing the technologies recognition of physical points and joints on the body we redefine these mapping points to the joints of our human pictograms. The support pictograms were chosen from the most familiar images from different pictographic font families.

The second occurrence that changed the project was not planned. While working with the cut-out pictogram figures, we rested a figure in front of the computer screen. Looking at the pictogram in front of the screen, we realized the possibilities of combining both the physical and digital worlds. This initiated the development of a small and very simple mobile theatre. The theatre was built around an iPad which created a back-drop with a choice of images, a cardboard box held the iPad in place and created a 'stage' in front of it, and the cut-out pictograms became actors and properties that could move on the three-dimensional stage creating a small-scale theatre.

When we tested an early prototype, one of the participants told us how he had to present his life story over and over again to different social workers. We saw the need for a tool that not only could be used in conversations, but also could record the illustrated story. As the PictoTheatre is so compact it is also easy to photograph and record the stories for future use.



In 2015–16 the PictoTheatre was discussed and tested with the help of Bergen Clinics and test groups of people with experience from drug misuse (our co-designers), it was simplified for flexibility[8]. The number of pictograms in the toolkit should not be too large, unlike the projects Blissymbolics which has over 4000, our pictogram language does not need to be so specific. We started with 50 and made over 200 'general' pictograms, the testing indicated that the tool becomes too complicated if we include more than 100 pictograms as it becomes more difficult to find the pictogram you are searching for amongst all the others. The pictograms should not be too specific as this can limit their flexibility and hinders the flow of storytelling. With only 100 pictograms and one box/theatre stage (approximately 20 × 20 cm) we were now able to produce the toolkit at low cost, if the iPad and camera are provided by the users.

In 2016, to investigate how the PictoTheatre prototype worked in conversation with people from different cultures and challenged by learning the Norwegian language we took the toolkit to an event where refugees could meet locals. We tested the PictoTheatre with, amongst others, three young men from Syria, who had only been living in Norway for a few months. Their Norwegian language skills were still at an early stage. We soon experienced that they needed additional pictograms to the ones included in our toolkit prototype. New pictograms or pictograms with extended meaning were easy to make there and then, using paper and scissors. We added images from the internet for the stage backdrop, and then the refugees played around with pictograms on the stage, visually telling us about their journeys from Syria to Norway, about their education and work, and what they had left at home.

8 In Pictogram-me participants can be referred to as co-designers. In an article published in the 1960s' Sherry Arnstein (1969) describes how citizens can be involved or excluded from development processes. In his "Ladder of citizen participation", Arnstein points at eight different degrees of involving, and relate this to power: "There is a critical difference between going through the empty ritual of participation and having the real power needed to affect the outcome of the process" (Arnstein, 1969, p.2). The top level, citizen control, has much in common with co-design.





To contribute with new pictograms and accessories made the participants proud, and gave them the opportunity to use their craft skills and work together. It also gave us the insight that the toolkit should be a combination of both a finished product and a 'do-it-yourself' concept. When the user creates pictograms and the stories themselves, then conversation also becomes easier and their stories come to life.

5. Conclusion

We introduced the use of pictograms in this paper with our inspiration from Neurath's Isotype and his philosophy that *pictures unite*. We have asked ourselves how we could revitalize his ideology and further develop it, through our research into the possibilities to use pictograms as tools for emotional dialogue and/or bridge the gap between people with different cultural and social backgrounds by developing visual tools enabling people to tell their own stories. Our findings show that pictograms can be made into powerful tools for emotional dialogue. The project has led to the development of a pictographic tool, the PictoTheatre, to empower our participants to visualize their stories.

We have re-invented the use of pictograms as tools – based on Neurath's ideology to democratize communication by making information accessible for the illiterate through pictographic visualization. More explicitly, our contribution in relation to Neurath's work is not only making information accessible to challenged groups but empowering people with challenges to communicate between themselves or with others their own stories and statements. We have created a new tool for visual dialogue.

Our experience is that the use of pictograms is a language that has the ability to empower challenged groups to tell their stories, because pictograms are a language that people universally feel familiar with and


Pictogram-me er utviklet
ved Institutt for design,
Fakultet for kunst, musikk
og design, UiB.



understand, they are therefore very comfortable expressing themselves with them.

The simplicity of the pictographic language can disguise its depth, although its basic forms are liberated from carrying specific burdens of meaning or channelling a limited or narrowly defined meaning a set of the simplest of pictograms can be used to tell stories with a variety of interpretations about the complexity of the real world.

Our explanation is that a pictogram is like a picture; it can tell subjective and emotional stories, rather than having to negotiate challenges and personal traumas through the verbal narrative only. Pictograms are also neutral and traditionally impersonal and objective, which makes it easier for our theme representatives to use them to tell stories that are very sensitive and personal; stories that can be told more easily because of the pictograms anonymity and simultaneous objectivity and subjectivity. When exposing the pictographic visualizations, our subjects may remain anonymous, which is why pictograms are an excellent tool for telling emotional stories.

Our observations from our research are firstly, that our participants have shown a surprising affinity towards our pictograms, which are familiar and recognizable from signage and interfaces that surround us daily. Pictograms are often presented as our helpers presenting information, directing or warning us, they are designed for maximum familiarity.

Secondly that we believe that the pictogram's neutrality is its strength in this emotional context. You can interpret the pictograms and the pictographic stories with your own associations, and this can arouse emotions and thus empathy. Talking with pictures may help both the storyteller and the listener to maintain a distance to the stories that could otherwise affect us too strongly, or affect us in a way that is not helpful.

Thirdly, it was easier than anticipated to encourage empathy through the use of the PictoTheatre. The Pictographic stories could give us insight into another's life and how the participant, with his background and history, experienced his situation. It can be used as a tool to facilitate conversation, telling and listening, and thereby to augment solidarity and shared feelings between the participant and the listener.

Finally, that the PictoTheatre's strength lies in the fact that everyone can understand it, it is a universal language. With the PictoTheatre people can communicate to one another their infinitely varied and complex experiences, and difficult conversations can be made easier when you also have the ability to 'talk with your hands'.



The PictoTheatre is presently being tested by design students in health care working with people with dementia. Researching how to improve communication between patient and families and patient and nurses. We are now awaiting and looking forward to their findings but, preliminary feedback was the need of more pictograms to enable the patients to help recall memories or moments, for example 'dancing cheek to cheek'. We have also received questions about, and interest in testing of and usage of the PictoTheatre from different public organizations working with groups of refugees, foreign prostitutes and drug addicts.

There are challenges for the future of the PictoTheatre, it has developed from being an Artistic research project to a tool which should be offered into professional service. The PictoTheatre can make a difficult conversation into a playful workshop, it can be a therapeutic tool. In our judgement and after our design research, stories of bad experiences and tragedies with this facilitating tool, should be told in the company of professional therapists. As our research and testing demonstrates, stories can become even stronger when they are visualized, and the tool should be used with care.

The PictoTheatre is now finalizing the prototyping phase in preparation for professional physical production, we hope mass production. The blueprints will be shared online, enabling anyone to make a version of the theatre themselves.

Ashley Booth
Professor Visual Communication,
Department of Design,
Faculty of Art, Music and Design,
University of Bergen,
ashley.booth@uib.no

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Collective Individualism in Design Education

Harah Chon, Nur Hidayah Abu Bakar

Abstract

Interdisciplinarity has allowed design education to expand beyond its traditional practises to integrate methodologies for understanding and addressing complexities, structuring and organising critical perspectives, externalising through visual representations, and reflecting on propositions and intended outcomes. Design establishes itself as a social process when situated within real-world contexts, thereby repositioning collectivity as an inevitable condition of design research and practice. This paper introduces the learning and working dynamics of design research students engaged in self-directed studies to examine how individual practises subsequently influence collective references in forming thematic parallels. Examples of student research are used to illustrate how divergent explorations of design issues converge to produce less insular approaches towards a collective body of knowledge. This paper discusses how individual perspectives contribute to unanticipated collectivity, communicating the value of facilitating a shared learning curriculum for design research and practise.

Theme: Conflicts
Keywords: collective individualism, design education, communities of practise, curricular research and practise

1. Introduction

Today, Asian countries have assumed an international, economic, and cultural prominence. The fast changing cultures of media, music, fashion, and information have radically transformed conventional Asian societies and their visual identities to renegotiate tradition in ways that can be challenging, innovative, and provocative. The tension between traditional and modern cultures forms the dynamic and diverse influences in Asia through complementary debates on issues of traditional to contemporary, old and new perspectives, and local and global concerns. These debates commence an interesting proposition to present the research backdrop of relevant case-studies for students.

In recent years, countries like Japan, Korea, Hong Kong, Taiwan, and Singapore are emerging as major players in design to influence and contribute to the creative economy. Aligned with Singapore's vision of becoming a global city for design creativity, this focus on the creative indus-

tries has presented a timely reintroduction of design to the design sectors of Singapore and Southeast Asia. Singapore's strategic, geographical position represents an opportunity to become the meeting point for strategic design, research, and innovation.

The development of design learning has resulted in a fragmentation of design knowledge against an array of specialisations where the connections and integrations for humanity are misaligned, suggesting that the field of design seek better understandings through new structures of learning and models of research (Buchanan, 2001). As the design environment becomes increasingly interdisciplinary, it requires intellectually inquiring design processes that address physical, aesthetical, communicative, and social needs. This positions the role of design as a catalyst for the breeding of new ideas, approaches to problem solving with more synthesised perspectives on varied disciplines, and evolvement with other non-design related subject areas.

Buchanan's (2001) call for new design research was centred on bringing together knowledge from other disciplines to integrate into the creation of products to impact and serve human life through the accomplishment of individual and collective goals. In its inquiring nature, design is defined by research activities with socially embedded consequences. Within the scope of design, interdisciplinary practise is demonstrated by the ability to employ concepts and methodologies from other disciplines to result in new understandings for the primary discipline (Dykes et al., 2009). According to Cross (2001), the interdisciplinary study of design is evident in the common perceptions, experiences, conversations, and creative activities involved in the making of the artificial world. What designers know explicitly is the human-made world of artefacts, wherein the practise forms its own intellectual culture to allow designers to build new knowledge for their primary disciplines through interdisciplinary design.

This paper introduces the pedagogical framing of a newly launched Masters in Design programme that is set against the interdisciplinary conditions set by the design landscape of Singapore. Through an overview of the postgraduate research framework and examples of student research, the concept of collective individualism is introduced and discussed to build arguments for how individual practise contributes to the collective knowledge of the programme to further inform the trends and directions for design research against the Singapore context and surrounding region.

2. Framework of postgraduate research

2.1 Introduction to the Programme

The MA Design Programme at LASALLE College of the Arts is deeply rooted in a variety of research activities to support creative design processes, applications, methods, and contexts within interdisicplinary design. Buchanan (1999) highlighted the role of design research as being a significant, most sophisticated, and well-grounded form of investigating design. Fundamental to any learning of design, this vital role will prepare researchers and educators to expand existing knowledge through original forms of inquiry.

Underpinned by Dorst's (2015) "Five Lessons from Design" the Programme is positioned to push the boundaries of design fields against open, complex, dynamic, and networked problem situations. The following Table summarises five practises fundamental to the understanding of design and its complexities.

5 Lessons from design	
Practise	Description
Coevolution	▪ Constant iteration of analysis, synthesis, and evaluation between the design spaces – problem space & solution space ▪ Design practise is the bridging the two design spaces, leading towards the creation of ideas
Developing Problem Situations	▪ Occurs through abstraction to examine past and present conditions to understand future contexts
Handling Frames	▪ Requires use of metaphor to allow the contextualisation of the design problem ▪ Episodic and defined by freshness
Exploring Themes	▪ Informal process of design for the purpose of sense-making – captures the underlying phenomenon ▪ Meaningful elements of the design situation
Fostering a Discourse	▪ The physical and intellectual environment for inspiration and reflection ▪ Defines a new space for approaching the problem situation

Table 1. Five Practises for Framing Design (Adapted from Dorst., 2015)

Designers have crafted new platforms, carved new roles, and added new competencies to meet emerging challenges. This has led to the forming of 'design clusters' to investigate the broader capacities of design and ever-

changing roles of the designer. Design is not constant and requires the ability of designers to reinvent themselves to fit into changing environments and situations through interdisciplinary approaches to challenge existing design norms.

The MA Design Programme builds upon the above conditions, set by Dorst (2015), in its pedagogical approach to support the relationship between research and practise through interdisciplinary design. According to Dykes *et al.* (2010), interdisciplinary design contains at least two disciplines and an interdisciplinary designer should demonstrate specialist knowledge in more than one field. The ability of the interdisciplinary designer to work across several fields of knowledge, through designerly activities, strengthens the primary discipline while influencing the emergence of new forms of design practise.

2.2 Synthesising Ideas from 4 Core Themes

The four themes below form the research engines for postgraduate students to develop their research-practise projects. These research themes (Table 2) are termed 'super-clusters' (Figure 1), as broad frames for the various contexts of design. Each theme presents students with the opportunity to identify, examine, and evaluate design challenges against the context of current and evolving societal, cultural, political, and technical issues.

2.3 Key Exercises – Questioning Design

Students in the MA Design Programme work across and respond to various design labs and tasks to support any of the above research themes. The primary objective is to uncover the research threads that can develop into research-led practise processes and new research areas, providing sufficient grounds for the dialogic and critical discourses of design. Projects are led by different research methods and focus on three key design exercises to assess the design context and situation, explore different possibilities and perspectives, and design a research plan.

The MA Design Programme was developed to foster research-led ideations and expand on design processes through interdisciplinary research. According to Bremner & Rodgers (2013), interdisciplinarity requires the designer to connect history and theory to practise so as to overcome specialisation and address problems characterised by com-

Super Clusters	
Theme	Description
Contemporary Cities	▪ Uses design to inquire after new modes of behaviour for contemporary society and what it means in terms of urban transformations. ▪ Focuses on how designers can transform the everyday experiences and worldviews of urban dwellers by questioning how notions of the contemporary city can be both profoundly local and dynamically global. ▪ Provides a contextual framing of the complex economic, political, social, and environmental conditions through a critical vocabulary that is capable of creating opportunities for dialogue between various social, technological, economic or political constituencies in influencing urban growth and development. ▪ Probes new ideas of how we will live in cities in the future.
Future Identities	▪ Questions the quality of reflective design practice to propose new creative perspectives and critical paradigms for design futures. ▪ Embarks on investigations on what the future might hold for design through speculation, critical thinking, and devising appropriate design and innovation strategies that can address changing markets, competitor contributions, organisational capabilities and business objectives. ▪ Contributes to changing trends, new research or applied knowledge that can lead to innovative design models to improve the built environment and the human condition.
Objects & Representation	▪ Focuses on designed objects and their various effects on the material culture of today to open up discussions on history, philosophy and the relationships between people, objects and representations. ▪ Questions interactions existing within social relations to objects beyond the superficial, beyond the ordinary. ▪ Investigates relationships between man and his object/s for future discourse.
Citizen Designer	Questions how designers can affect political or social change, and what that means for social designers to be design conscious against the fast-changing environments of Asia and beyond. Questions the impact of design on citizenry by raising issues existing in the minds of conscientious designers dealing with issues at the educational, individual, corporate, and grassroots levels.

Table 2. Research Themes

Design Lab Projects			
Key Exercise	Scenario Designing	Changing Roles	Evidence & Artifact Finding
Objective	Looks at current trends and emerging socio-cultural themes to push the boundaries of individual research areas	Students are given different existing roles in the creative industry and put on different 'thinking hats' based on these roles to answer the key question, "How would I respond to this if I was a _____?"	Focuses on fact finding and collating visual research pertaining to research themes.
Outcome	Listing of key words linked to their research.	Navigates into different territories and expands the interdisciplinarity of their own projects.	Develops design processes through filtering, selecting, archiving, and documenting the knowledge, information, evidences, and visuals into a concept map visualising the research area.

Table 3. Key Design Exercises

plexity. Interdisciplinary design demonstrates the use of methods to construct overarching frameworks that connect history, theory, and practise to new sets of problems. This positions the student researcher with the challenge to negotiate broader views and understandings to extend specialist knowledge into other disciplines through contextualising and reframing the role of design.

3. Individual practise to collective individualism

The MA Design Progamme requires students to undertake individual research within any of the four themes (Table 2) and interdisciplinary approaches are encouraged to support the triangulation of research, theory, and practise. Interdisciplinary research is suggestive of collaborative activities to exchange knowledge across people and disciplines. In contrast, individual research comprises notions of autonomy and independence as part of developing unique perspectives, methodologies, and

interpretations for addressing design problems. This section discusses how individual practise produces a form of collective individualism, wherein exchange lends itself to the cross-pollination of ideas to inform new research issues and themes.

3.1 What is Collective Individualism

The constructs of collectivism and individualism have been studied to understand cultural differences from the fields of psychology and sociology, producing a range of measurements for how individual self-concepts vary according to cultural predisposition, environmental factors, social interaction and context. Singelis *et al.* (1995) outline four distinctive dimensions of collectivism and individualism (Table 4).

4 Constructs of individualism and collectivism

Construct	Characteristics
Vertical Collectivism	▪ Individual sees self as an aspect of an in-group ▪ Self is interdependent and different from the self of others ▪ Inequality is accepted
Horizontal Collectivism	▪ Individual sees self as an aspect of an in-group ▪ Self is interdependent and the same as the self of others ▪ Equality is essential
Vertical Individualism	▪ Autonomous self is postulated ▪ Self is ***independent and different from the self of others*** ▪ Competition is important
Horizontal Individualism	▪ Autonomous self is postulated ▪ Self is ***independent and the same as the self of others*** ▪ Equal status is accepted

Table 4. Vertical and Horizontal Cultural Dimensions (Adapted from Singelis et al., 1995)

Horizontal individualism postulates that the spirit of individuality is exerted autonomously from the influences of others, yet leans toward collectivist thinking when placed within social relationships. The conceptualisation is further discussed in this paper as *collective individualism*, positioning the horizontal individual as an active group member in the concomitant outcomes of the collective whole. The individualised practises of students are representative of independent research that result in a shared body of knowledge, suggesting that individualism can

only be expressed against collectivist dimensions to produce a network of collective individualism.

3.2 Individualised Research & Practise

This section introduces three examples of ongoing postgraduate research to review how individual conceptions of design practise undergo the cross-pollination of ideas to inform thematic parallels of design research and identify emerging issues for future curricular planning.

1. *The Value of Narrative (Nicholas Ooi)*
   This project looks at how the role of storytelling, through representation and meaning, assigns and regenerates the value of objects. Narratives allow designers to effectively translate and communicate an object's intended meaning, developing a visual language or code by which a design taxonomy can be produced. The main objectives of the project review the profound feelings of emotional loss with material objects and how the processes of refurbishment and reappropriation produce new emotional connections, aided by use of narratives. An initial prototype of a piano bench was developed (Figure 3), combining the adjustability of the student's bench height with the stationary seat of the teacher, to allow for the bench to grow and develop with the student.
2. *Walkability of Jakarta (Jocelyn Sufiana)*
   Jakarta is one of the most densely populated cities of the world, where failed urban planning and infrastructure have resulted in the loss of walkability. This project identifies what makes urban dwellings walkable and how Jakarta's infrastructure can adopt the principles of urban placemaking to promote concepts of livability and walkability for its citizens. The research identified the key cultural factors and economic variables contributing to the current 'unwalkability' of Jakarta, producing a proposed urban plan that introduces a new way of life with pedestrian-friendly areas and spaces in West Jakarta.
3. *The Governance of Time (Siang Hwee Tay)*
   This project examines the rapid development of Singapore as a critique on the conceptions of time, space, and productivity among its citizens. The project studied the significance of 'pause' and how the slowing down of life, activities, pace, and thinking

allow for more meaningful and intentional experiences to occur. It is only through moments of reflection and pause that memories are triggered and their significances recalled. Through a series of design-led activities, the role of intentional pauses was studied and documented to further understand how pause acts a precondition of reflective practise.

The three projects above address larger conceptions for how design is situated and positioned to influence individuals through product semantics and emotional design, urban and cultural placemaking, and reflective activities. Each of the projects reviews the contextual framing of design against historical facts, socioeconomic influences, cultural implications, and the human condition to build upon the research themes of the Programme.

3.3 Forming of Research Themes

The MA Design Programme comprises four research themes that serve as the overarching concepts under which independent research is situated. Table 5 outlines how each of the student projects integrates the core themes to inquire into the current state of design with key themes arising from preliminary research and practise. Individual experiences are design-centric in how the problems are theoretically framed and the manner with which they are conceptually questioned, tested, and explored through design practise. The overarching research themes expand upon the contexts of the projects through divergent thinking while individual practise refocuses the broad scope of research through the convergence of underlying concepts and themes.

The interdisciplinary curriculum of the MA Design Programme adapts Dorst's (2014) steps for framing design and its complexities through the negotiation of problem and solution spaces, examination of past and present contexts, framing of design problems, exploration of themes for sense-making, and the development of a discourse. In the exploration of themes, students have identified key themes relating to their individual research to inform the research parameters of the Programme. The key themes are defined by design intentions, values, implications and categorisations. These themes lead to the building of discourses, allowing students to fully contextualise the project scope and formulate the main research objectives.

Emergent Themes of Individualised Research				
Project Title		The Value of Narrative	Walkability of Jakarta	The Governance of Time
Research Theme		Objects & Representation	▪ Contemporary Cities ▪ Citizen Designer ▪ Design Futures	▪ Contemporary Cities ▪ Citizen Designer
Thematic Parallels	▪ Design Intention ▪ Design Value ▪ Design Implication ▪ Design Categorisation	▪ Meaning-Making ▪ Object ▪ Metaphor ▪ Emotional Design	▪ Place-Making ▪ Space ▪ Way of Life ▪ Emphatic Design	▪ Time-Making ▪ Pause ▪ Appreciation ▪ Disruptive Design

Table 5. Thematic Parallels of Individual Research

Horizontal individualism is evident in the directions that students lead in further challenging the boundaries of existing knowledge and design practise through individually developed inquiries into design problems. The students assume the role of designer-researcher, reifying the shared sense of self in holding equal status, while autonomously processing and applying information. The collective dimensions are demonstrated in the common body of knowledge built from the sharing and feedback of ideas throughout research progression.

The key themes are indicative of how individualised research presents thematic parallels from the different student researchers, leading to the setting of parameters for the Programme's structure in prescribing the necessary themes to organise future design research activities. As students engage in sharing and feedback sessions, the domains of project-specific knowledge are shared to contribute to a collective body of knowledge. Collective individualism is evidenced by the shift from individualised practise towards an exchange in ideas, conceptions, areas of focus, themes, and understandings of design (Table 6). The collective dimensions of individual practise inform the thematic parallels influencing the development of individual research that, in turn, produce a shared knowledge base supporting the research themes of the Programme.

Knowledge Sharing			
Project Title	The Value of Narrative	Walkability of Jakarta	The Governance of Time
Design Intention	▪ Time is necessary to Meaning-Making	▪ Meaning is a precondition to Place-Making	▪ Place affords Time-Making
Design Value	▪ Pause is necessary to the Value the Object	▪ Object is necessary to the Value of Space	▪ Space is necessary to the Value of Pause
Design Implication	▪ Metaphor as a form of Appreciation	▪ Way of Life as a Metaphor	▪ Appreciation as a Way of Life
Design Categorisation	▪ Emotional Design through Disruption	▪ Emphatic Design through Emotion	▪ Disruptive Design through Emphatics

Table 6. Cross-Pollination through Collective Individualism

4. Educational implications

Interdisciplinary research is a complex undertaking that requires critical approaches to effectively implement design as a problem-solving practise. The development of innovative pedagogical approaches and emphasis on the triangulation between research into theory, theory into practise, and the theorising of practise pushes design boundaries towards a much-needed paradigm shift for design education in Singapore. This is evidenced by the MA Design Programme's pedagogical framework which encourages *divergent thinking* to expand on knowledge, *convergent thinking* to develop a focused research plan, and *converging-diverging* thinking to situate the outcomes against relevant contexts and situations.

According to Poggenpohl (2015), an important contextual change affecting design is the need to extend beyond the individual experience with knowledge and skill contributions from different disciplines to produce complementary methods, interactions, and processes of knowing. Human experience reveals the existence of problems and possibilities, positioning the role of designer-researchers to become readers and thinkers to pragmatically frame research problems. The Programme embeds the divergent-convergent scaffolding to provide better design potential contributing towards the building of a body of design knowledge.

Demirbas and Demirkan (2007) distinguish between diverging and converging learning as abductive and deductive perceptions toward concrete experiences. Divergent thinking is carried out through individual practise, where students develop an appreciation for the conditions of design and build upon specialist knowledge from neighbouring disciplines to develop the capacity towards interdisciplinary research. Convergent thinking is demonstrated in the synthesising of theories, ideas, and preliminary research findings to form the key themes of research. This paper discusses how individual practise, embodying the principles of interdisciplinarity, shifts into the dimensions of collective individualism through knowledge exchange and transference to create a shared base of knowledge. The communication of research stages and progression allow students to engage with new perspectives, thematic concepts, and information.

The plurality of design suggests the indeterminacy of its approaches to practise or research implications, as the role of design is dependent upon specific contexts of meaning. Poggenpohl (2015) states that the building of communities of research practise reconciles gaps between research and practise, requiring teachers of design to initiate students to share research and engage with other practitioners for the extension of design's future through knowledge building.

This paper has introduced the interdisciplinary foundations of a newly launched MA Design Programme through discussions of how students embark on individual research and practise, contributing to the collective development of research themes and concepts. Individual practise was introduced through examples of ongoing student research to illustrate how collective individualism occurs through knowledge exchange, where the cross-pollination of ideas produces thematic parallels to influence individual practise. These parallels in research direct future themes for the Programme, creating a knowledge base specific to the design landscape of Singapore while contributing to larger communities of research practise.

Harah Chon
Artist-in-Residence, Faculty of Design Lasalle College of the Arts, Singapore,
harah.chon@lasalle.edu.sg

Nur Hidayah Abu bakar
Dean, Faculty of Design Lasalle College of the Arts, Singapore,
hidayah.bakar@lasalle.edu.sg

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Words Upon A Place Highlights from a Design Experiment on Sharing/Using/Experiencing Urban Places

Anne Corlin, Canan Akoglu

Abstract

The increased mobility of people across the world is a premise that needs to be taken into account and cities must be designed towards being able to maintain that. Placing newcomers in segregated places in cities is not the solution. The question is, therefore, how do we actually create places for interaction, together? This paper explores place attachment (Relph, 1976), territorialisation (Brighenti, 2010, 2014, Kärrholm, 2017) and Sennet's (1993) argumentation about how we need to live more impersonal in the city through a design experiment 'Words Upon a Place.' The experiment is a part of a Ph.D. investing pivotal design parameters when developing public urban places which support interaction between people and a coherent city. It discusses the emergence of a place and interaction with people based on Actor-network Theory (Latour, 2005; Yaneva and Heaphy, 2012) and takes both physical, social and structural 'actors' into account as design parameters. The design experiment 'Words Upon a Place' uses the design process and placement of four interactive benches, situated in two locations in the Danish city, Kolding: The social housing neighbourhood, Skovparken, and the Library Park, to explore how arranging a physical design into two different urban 'arenas' reveals knowledge about the two places in accordance to pivotal actors on the places. The method used is action research based on Archer's (1995) explanation. The project was intended as a 'constructive research design' (Koskinen, 2011). But the negotiation, we made turned the project into an action research project, where the researcher influences and works with the different actors in the process of obtaining increased knowledge about the two places. The experiment started with preparations for two workshops, – 'Story Telling Cafe,' where participants were asked to tell a story based on the place, to be incorporated into the benches. After the workshop, the benches were developed and placed in August 2017. The benches work as such: when one sits on them, a story from one of the two places is played. After just one week, the benches in Skovparken were destroyed. This incident gave rise to a conversation with the boys who did it to understand the reason behind. The design experiment shows us two fundamental points to take into consideration in the development of shared urban places. Firstly, the interaction among universities, design and architecture schools and the public life can be integrated by doing design and acting on

design in the 'field' as a design parameter on the same level as deciding for a form or a material. Secondly, 'together places' are places open for negotiation. By nature, designers have a potential role identifying the typology of the public place that they deal with to point out the negotiators (or actors to be transformed) to create more democratic and equally voiced contexts and design solutions in the end. Therefore, these actions need to be taken by designers as well, not only by social workers-ideally in a strong collaboration between designers, social workers, and other related stakeholders.

Theme: Conflicts
Keywords: citizen involvement, urban places, place attachment, democratic space, negotiation

1. Introduction

The increased mobility of people across the world is a premiss needed to be taken into account, and cities must be designed towards being able to maintain that. To respond to the increased mobility and the fact that less space must obtain more people in the future, we must also focus on sharing of things as places (Brinkø et al., 2014). The important question is, therefore, how do we actually create sharing places in a way where we can be there together? Based on this perspective, the paper explores place attachment (Relph, 1976), territorialisation (Brighenti, 2010, 2014; Kärrholm, 2017), Sennet's[1] (1993) argumentation about how we need to live more impersonal in the city, and how to design for a democratic place by acknowledging the power relations (Mouffe, 1993), through the design experiment 'Words Upon a Place.' The experiment is a part of the Ph.D. project 'Place Making | Makers', which invests pivotal design parameters when developing public urban places supporting a coherent city, the interaction between people and the social life. The Ph.D. discusses the emergence of a place and interaction with and between people based on Actor-network Theory (Latour, 2005; Yaneva and Heaphy, 2012) and therefore, takes both physical, social and structural 'actors' into account as design parameters influencing on a place. Actors from an ANT perspective in the subject matter of public urban places can, therefore, be houses, streets, people, animals legislations and all other things influencing on

1 Richard Sennet, – https://www.youtube.com/watch?v=1p4Qxc6pMeo

the place, and the core in ANT is that it looks at what things do instead of what it is. In this specific context of the experiment is the most pivotal actor in one of the locations, a group of young boys, hanging out at the place each day and evening. They are the most dominant element in most the other inhabitant's experience of the place, and the boys cause fear and prevent the other inhabitants of the neighborhood from using the place. 'Words Upon a place' is the Ph.D.'s last design experiment. It uses the design process and placement of four interactive benches, placed on two different locations in the Danish city, Kolding, to study, how 'throwing' a physical design into two different 'urban arenas' reveals knowledge about the two places in relation to important actors on the places. The experiment shows how an 'existential place attachment' (Relph, 1976) can be a constraint for interaction and also how no place attachment from anyone at the other place shows other constraints. The term existential place attachment refers to 1 Richard Sennet, – https://www.youtube.com/watch?v=1p4Qxc6pMeo Relph's (1976) argumentation, where people who feel an existential place attachment towards a place identifies it with home and are thereby, not open to sharing the place. Finally, does the experiment reveals knowledge about the use of design to create places where we can be together. How *doing* design becomes a design parameter, which opens up for negotiation of place and thereby, lowers the constraints for interaction.

2. Relationships to Place

Earlier studies in the Ph.D. project shows that respondents in a social housing neightborhood tend to relate more to places in the city and their neighborhood based on experiences and memories, than on aesthetic preferences. Pallasmaa (2005) describes how we experience our surroundings with all of our senses and not just our vision. He describes, how we relate and identify with places, and how they become a part of us – both places we have visited that only exist in our memory and places we find ourselves in on a daily basis: "*The architectural space is the lived space more than the physical space. Lived space always transcends geometry and measurability*" (Pallasmaa, 2012, s. 68).

Geographer Relph (1976) explains different levels of Place attachment and how involvement has a positive impact on the way one experiences a place; additionally, emphasizes 'insideness' and 'outsideness' and in what level people find themselves depending on their relationship with

	Existential outsideness	Objective outsideness	Incidental outsideness	Vicarious insideness	Behavioural indsideness	Empathetic insideness	Existential Insideness
Main Charateristic	All places asume the same, with meaningless identity. This place has no meaning to the user. You look from the outside and has no relation to it	Totally objectivity towards the place As proffesionel constructs in relation to logic, reason and efficiency	An unconscious attitude towards the place Sees it as background Activities could be anywhere else	Haven´t actually been in the place Feels involvment throgh the narrative, because they can relate to similar known places	Deliberately attending to the apperance of the place Sees the place as containing objects, views and and activities	Sees the place as meaningfull and can identity with the place Experiencing an emotional and empathetic involvement with the place	Home, own town og region Know the place and its people Feeling of belonging and a deep, complite identity with the place
User type	People looking at a map, with no relation to the place	Proffesional planners or architects	Users with no relation to the place	Recipients of a history or art, that they can relate to	Visitors because of functions	Users who identity with the place Place attachment	Residents or people with a special belonging to a place Place attachment

Table 1. Levels of Place attachment

the place. Relph (1976) mentions about an emotional and empathetic involvement with the place and a need for identification with the place without giving any examples of how this will occur but argues that place attachment will only arise through users who have a special belonging to the place or can identify themselves with the place. Relph's descriptions are collected in the scheme below, table 1, and show the different levels of insideness and outsideness in relation to Place attachment and how they, in accordance to Relph, are characterised and motivated and who the user is then.

Place attachment is an indicator of how people will relate to a place in the future and thereby, how people will use and take care of it. If Place attachment must occur, people must be able to identify with the place. Accordance to Relph (1976) does this only occurs with empathetic insideness and existential insideness. Relph (1976) defines *"place-making as a continuous process where places gain authenticity by being modified and dwelled in by insiders"* (ibid, p. 146). He concludes that empathetic or existential insideness are the levels that generate robust engagement in a place. As existential insideness may result in the exclusion of others, it appears to be empathetic insideness and also behavioral insideness that are fruitful when developing public spaces, where we can be together. Both empathetic insideness and behavioral insideness also fits into Sennets (2015) argumentation of living more impersonal in the city. It also supports a level of hierarchy and power relations (Mouffe, 1993), where some users add identity to the place, and

others are more visitors to the place identity because functions or atmosphere attract them.

Jacobs (1977) argues that urban renewal did not respect the needs of most city-dwellers and argued that all lived life on earth is delineated by some physical surroundings and how these spatial structures and objects are placed influences on the interaction between people inside a neighborhood and also across a city. It is many of these challenges we see in the modernistic housing areas, where stays and movements are separated, which prevents a natural interaction between the inhabitants, and the housing areas exist as independent enclaves, which are not well connected with the rest of the city.

Sennet (1993) makes two points to take into consideration: The first one is the porous city where the edges are potential places for interaction; secondly how cities are too mono-functional and argue for the pluralist city in order to make the city more tolerant. We should have a less stronger identification with home; we should learn how to use the city and live in the city in a more impersonal way (Sennet 2015). The pluralist city is where one function might take over after another or could be present at same time. Therefore, places, where we can be together, are connected with negotiating in relation to acts, actors, functions and time. Belk (2009) talks about two kinds of sharing: 'demand sharing' and 'open sharing.' They both refer to a one-way act of giving something to someone else (even though it includes intangible things as time or experience). What if we continue Belk's line of thoughts by adding a third level of sharing; the 'negotiating sharing,' where we 'allow' sharing of what is already (at least on paper) joint?

This leads to the final theoretical notion integrated into the discussion, which is the territorialisation of places. The original perception of territorialisation is related to a bounded geographical place, where someone attempts to control people, phenomena or relationships by delimiting a geographical area (Sack, 1986). The interpretation has developed into being broader and less tangible and is now related to time-space, acts, and patterns of relations. (Brighenti, 2014, 2010; Kärrholm, 2017). Kärholm (2017) puts forward temporary appropriation of places which often leads to territorialisation. It can happen by an 'Urban Tribe'[2] as a gang standing on a square every evening, but it can also occur through

2 Urban Tribe is a term invented by Arnold Reijndorp and Maarten Hajer (2001) to describe a specific user group in the city e.g. children families, gangs, skaters a.s.f.

a single act of taking up a seat at a lecture or in a bus. Territorialisation of places doesn't have to be agonistic as shown in the example above of single acts of temporary appropriation of place. Instead, we often act negotiating in and out of public places without even noticing it. Massey (2005) describes spaces and places as the product of social relations, often as agonistic and unequal and states: *" from the greatest public square to the smallest public park, these places are a product of, and internally dislocated by, heterogeneous and sometimes conflicting social identities/ relations"* (Ibid., p.152). This means that the presence of territorialisation and negotiation is at stake all the time, which makes it urgent to integrate as a conscious design parameter when developing and designing public urban places. This issue is also stated by Mouffe (1993) as such: *"Instead of trying to erase the traces of power and exclusion, democratic politics requires that they are brought to the fore, making them visible so that they can enter the terrain of contestation."* (Ibid, p. 149). The final quote is important since the experiment tells us that entering a democratic process of appreciating and articulate the different interest present at a place, makes room for negotiation the place in relation to time and space.

3. Processing the experiment

The method used to create this study is action research based on Bruce Archer's (1995) explanation, where he juxtaposes practice-based research with action research.

> *"systematic inquiry conducted through the medium of practical action: calculated to devise ortest new, or newly imported information, ideas, forms or procedures and generate communicable knowledge."* (Bruce Archer, 1995, p. 6)

The experiment is conducted through the use of the researcher's practice-based skills as an architect and designer and the object (in this case the benches) as the medium for providing knowledge about the situation. The making of benches was a way to make direct engagement with both the specific sites and the city as a whole. The benches can be seen as metaphors for a community in the city, and are used to break down barriers. The benches with stories from the deprived neighbourhood, Skovparken, potentially contribute to give a voice to people who might not have a

great voice in the public space, and thereby, support more equal access to the city.

The project was intended as a 'Constructive research design' (Koskinen, 2011) and developed through a participatory mindset. But the negotiation we made in both places – with the young boys in Skovparken and about increased visibility of the 'Library bench' – turned the project into an action research project, where the researcher influences and works with the different actors in the process of obtaining increased knowledge about the two places.

The design experiment focuses on both the process and the product as research materials and contains interviews, electronic questionnaires, observations and a diary as empirical data. The interviews investigate how and if participating in the project has influenced the workshop participants' place attachment. Electronic questionnaires' involve people who did not participate in the project about their experiences of sitting on the benches and hearing the stories. Observations of the places are used as a method for analysing the places in relation to potentials and constraints for interaction among people and supporting of a coherent city. James Spradley's matrix for field observations is used to structure the observations (1980, pp. 82–83). He writes that *"every social situation can be identified by three primary elements: a place, actors, and activities"* (Ibid. 1980, p.39). Based on this statement, Spradley (1980) developed a matrix which focuses on mapping the interactions that arise in the spaces between these elements. The Ph.D. researcher transformed the original matrix into a focused matrix for mapping places for interaction, which relates to the theory of places for interaction (Sennet, 1993; Relphs, 1976; Jacobs, 1977; Hajer and Reijndorp, 2001, Kärrholm, 2017) by adding a specific focus on the negotiation of place through the interaction of both physical and non-physical actors (Latour, 2005; Yaneva and Heaphy, 2012), the place identity, the use, and the place attachment.

The last set of data is a diary describing the progression of the design experiment-not every day, but every time something pivotal happened during the process, the negotiation processes with the two places and the involved actors.

4. Creating the Benches

The design experiment took off in spring 2017 in Kolding. The experiment is a collaboration between Alexandra Institute, with Kant Design as a

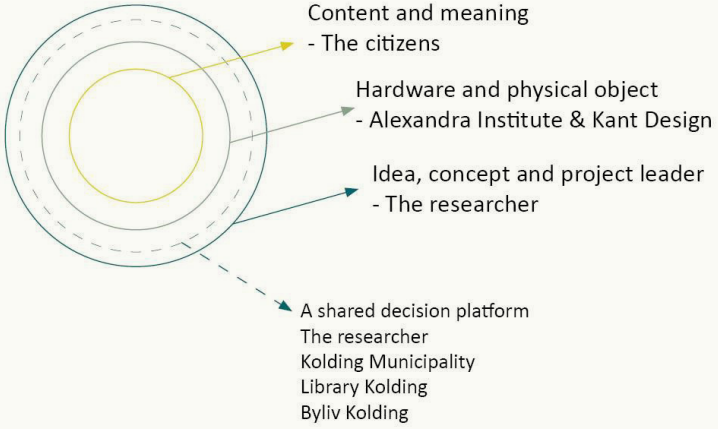


Figure 1. Role of participants Shows the roles which the different participants have in the project



Figure 2. Skovparken Center Square



Figure 3. The Library Park

subcontractor, Kolding Municipality, Kolding Library, Byliv Kolding (the organisation that takes care of all the social actions in the neighbourhood) and the Ph.D. researcher taking the role as the project leader. Figure 1 shows the constitution of the different roles and how each actor contributes to the projected.

The initial step was to choose two places to inhered in the experiment. The first place was the square in front of a shopping center in the social housing neighbourhood Skovparken. It was a natural choice due to the overall subject matter for investigation in the Ph.D. Earlier findings pointed at this place as a big constraint for coherency between the neighbourhood and the rest of the city and also as a place that causes constraints for interaction among the inhabitants inside the neighbourhood. The

square is domesticated by a group of young boys who gather there and use it as meeting point. Their way of grouping and their loud behavior create fear among the other inhabitants and affect them to avoid the place. The second place had two roles. First, as a comparative place which could qualify the discussions about how different levels of place attachment influence a place and to locate the difference in important actors (Latour, 2005; Yaneva and Heaphy, 2012). Secondly to see how the design artifact could support an increased coherence across the city. Furthermore, does the cultural setting fit the content of experiment? This made the Library easy to convince to enter the experiment; the place is dynamic with many people walking through each day and thereby many people passing the benches. The Library Park is in the city center; it is surrounded by the library, two hotels, and the main train station. Just next to the park is the city landmark, 'Koldinghus,' an old Castle, and a beautiful lake. The place is part of the cultural center of the city.

The design experiment started with preparations for two participant workshops – 'Story Telling Cafe' of which the participants were invited through Facebook and personal network. The workshops were conducted in a participatory process, where the citizens are involved in the design process, by directly bringing the content to the design product (the benches) in whatever way they felt safe, entertained or wished to expose themselves. The role of the citizens was to tell their stories from one of the two places. The 'rules' on the workshop was not negotiable, but the message to the participants was quite broad – "*We just want your stories from the place*." Stories from own experiences, stories about the place they made up or stories they have been told themselves, but wanted to hand down. There were nine participants in each workshop telling stories, just one participant misunderstood the message about the place-specificity and told two stories from a completely another place, which was dear to her.



Figure 4. Show a recording on one of the two storytelling cafés

The workshops also aimed to increase the engagement with the residents as Al-Kodmany (1999, p.37) puts forward: "they include enhancing the capacity of citizens to cultivate a stronger sense of commitment, increasing user satisfaction, ... and building trust." It is by now a well-doc-

umented theme that involving participants in a design project, arises a sense of commitment towards the design project. This project with no exception also reveals, that the citizens, who have been involved, have warm feelings towards the project and they feel proud about their participating in the project and their contribution in a city development project. This came as no surprise. The focus of the study is therefore twisted a bit to investigate if participating in the project affected their experiences and relations towards the places where the projects are located and not as much towards the specific design-project. (Due to length and time of the paper, it will not account for the affection the project has had on the participants, but instead focus on the reception on the two places.)

After the workshop, the benches were developed and placed in August 2017. The benches work as such: when one sits on them, it plays a story told by a citizen from one of the two places. There are sensors integrated into the benches which activate a computer when they are exposed to a pressure of more than five kg.

After Just one week, the benches in Skovparken were destroyed – the wires were cut open. The incident gave rise to enter a conversation with some of the 'gang' boys, standing at the center square, to understand why they had destroyed the benches. During the conversations It became apparent that because they spent many hours there every day, the continuing sound of the voices was annoying them. Based on these conversations the sound volume was turned down a bit, and the daily active sound timeframe was reduced. Until today, the benches are still working without being further destroyed. Even wall stickers telling about the project has not been ripped off.



Figure 5. The benches in Skovparken a day in mid-December, 2017



Figure 6. The benches in Library a day in mid-December with a big sign next to them.

The situation in the Library park is the opposite. Not that many people use them or pay much attention to them even though triple the number of people pass by them every day. In this public place, we need to make them more distinct and add a big sign telling about what to experience here.

As a sum up, we had to tune the benches in accordance with the two different places and not treat them as two similar public places. In Skovparken, we had to turn down the volume a bit and shortened the playing time. Furthermore, we had to enter a negotiation with the users who feel they own the place in order to be 'allowed' to add the benches to that area. Thus, both the benches and the boys could be there together.

In the Library park, we had to make the benches more visible and more attractive. The place is a lot bigger and also noisier because of the many cars driving by. Furthermore, the place is more perceived as an 'adventure' place, because of the Library, Koldinghus, and a beautiful lake which are within visual distance to the park. It's a place where everybody is equal visitors, and no one feels an existential place attachment (Relph, 1976). People have a public purpose for going there. Therefore, we had to match both the higher level of sounds and also the expectation of experiencing something which is related to the place.

In Picture 6 and Picture 8, the benches are shown just after they have been put up in late August and early September.



Figure 7. The guys, sitting on the other side of the 'negotiating table.'



Figure 8. Tourist from Luxemburg by the benches



Figure 9. Children in Skovparken trying the benches



Figure 10. A Picture of the benches in the Library park, taken by one of the participants, Kim Rosenstand who posted on his Facebook and Instagram posts, telling about the project he participated in.

Discussion and Conclusion

This section discusses how the different actor's behavior relates to levels of place attachment described by Relph (1976); how the behavior from the human actors (the young boys in Skovparken) support the integrated theory about territorialisation (Brighenti, 2010; Kärrholm, 2017), power structures (Mouffe, 1993) and also Sennet's request to live more impersonal in the city. The experiment contributes to strengthening existing theory, and it also shows how the scheme in Table 1 can function as an operational tool for practice. It shows how to work with design based on a viewpoint that all actors in a place can be transformable and that 'doing design' (negotiating with the boys) can be *a design*, like creating an object.

Relph (1976) describes different kinds of levels of interaction and how existential place attachment can create constraints for interaction, this is further supported by Sennet (1993, 2015). Mouffe (1993) argues that we can't ignore the power relations in a place. The gang of boys standing on the square in front of the shopping center turns the place into an agonistic place by claiming the area as their territory. They exclude other inhabitants by behaving in ways that cause fear. This makes them one of the biggest constraints for interaction. The boys feel an existential place attachment, and they protect their domain and territory by destroying the benches. They experience this place at a very personal level, identify themselves with this place which becomes part of their shared identity of living in a ghetto; an identity they find attractive and therefore have an interest in maintaining (Sennet 1993). This experiment shows how territorialisation and power demonstrations are present in a public place. It also shows how 'doing design' can push an existential place attachment towards a more empathetic place attachment. A move towards empathetic place attachment opens up for the opportunity to work with 'negotiating sharing' places (Belk, 2009), and thereby, places where we can be together.

When the boys move from an existential place attachment towards an empathetic place attachment, they show an understanding towards other social relations to the place and they are willing to 'make room' for other social relations at the square. The study thereby shows that design can move an actor's position. One pivotal design parameter at the square in Skovparken is the 'design doing' for changing the mindset of the young boys through the negotiation of the place. The 'negotiation space' that arose between the young boys and the researcher is a pivotal design parameter. It shows that social actors are just as fundamental as physical actors which means that Relph (1976)'s scheme (table 1) can be used as a tool for categorising how to approach different social actors in a place.

The Library park does not contain any human actors with an existential place attachment. There might be few with an empathetic insideness, feeling a shared identity with the library. Most of the human actors in the place can be seen in the category of behavioral insideness. They are there forthe function and the experience. Without any surprise, we had to turn up the 'adventure aspect' since the benches in the Park are part of a public transit and adventure place. The most important actors in the Library park are the Library and the central train station. The human actors are neither the ones who give identity to the place, nor they are the most important actors to take into account. In this place, the benches have to match with the Library and the train station. The benches do not incorporate the function of the train station, but they fit with the library function. In their presentvolume, they are a bit to less to fit the Library park. They should have been even more adventurous for attracting many people to come and sit on them and listen to the stories.

The scheme in Table 1 is developed based on Relph's descriptions of insideness and outsideness and combined with an ANT approach arguing that all elements both human and non-human are actors and we must focus on what the actors do, and not what they are. This approach could be a useful tool in analysing a place and in planning the design strategy when developing a place. It could support designers to decide how to balance the physical and non-physical design strategy relatedwith a place.

When the design experiment started, we have already foreseen that the boys were extremely important at the place. The Ph.D. researcher tried to integrate the boys in the project, to begin with, through a social worker in the neighborhood, but because of several constraints, that attempt was not successful. As an overall reflection, it is possible to say that the progression of the design experiment was successful especially

regarding having an important opportunity to create a before and after situation concerning how to design for negotiation. It is important to add that the benches have not transformed the place from being agonistic to foster interaction across the city, but they have contributed by creating an approach about how to work designerly in development of shared public places.

Anne Corlin
Ph.D. fellow and Head of Subject,
for Masterprogram, People.
Kolding Desin School, Danemark,
anc@dskd.dk

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Information design for empowering citizen activism through the use data as evidence

María de los Ángeles Briones

Abstract

Today we are witnessing social changes lead by technology in an unprecedented way. An increasing number of people live in a highly problematic, hyper-connected, open, complex and dynamic world. This context empowers new spaces of encounter and action, allowing people to meet in new ways around common needs that affect their daily life and seek solutions as a group.

New forms of citizenship collectives, DIY citizenship, civic initiatives and communities are having a leading role in the 'city making' and urban transformations worldwide. These actions could be seen as a new citizenship activism in which the emergence of technology democratize the use of digital platforms for connecting and scaling up. At the same time, digital technologies improve the use of data for involving people to adhere to causes and spread the collective action. The use of data in this type of activism is *essentially collective because knowledge and skills become relevant in the context of the group peers* (Milan, 2017). In this context, the relevance of Information Design and visualizations emerges as *the visualizations process and is also, and directly, a tool for community building* (Manzini, 2015).

How to stimulate collaborative practices from design, in a context of data abundance and technological democratization, where a relevant segment of citizenship is acting towards social issues and beginning to use data for these means? Information designers seems to have a key role: to organize information so people can make their own decisions and take effective action. This paper focuses on the role of information designers as amalgamators involved in setting the scene between the direct action and the communicative spheres in citizenship activism projects. Designers facilitate the collective process among diverse actors through design data strategies that mash up the communicative aim of visual artifacts according to the actions that they pursue as well as reaching expected audiences.

This paper explores the role of communication design in projects that seek to empower citizens to advocate for their social issues using data as evidence. How are collaborative practices through data communication happening? Data visualizations among other communication artifacts constitute part of the data activism communication repertoire that citizen activism is starting to incorporate in their ways of doing. Through a case study analysis of 8 projects, this

paper delves in data-strategies behind communicative artifacts that pursue citizen collective action.

Cases are analyzed through a critical approach (Dörk et al., 2013) from its disruptive aesthetics (Markussen, 2013) problem space and spaces of contest (Fuad-Luke, 2009; DiSalvo, 2012) considering their design techniques and design activist methods. The design data strategies identified seek to contribute to the amalgamation role of the designers involved in the communication design of citizen activism projects. Despite the diverse aims and targets of each case, first results attempt to frame the strategies that link the digital visual artifacts and the post-action that they pursue. Lack of documentation on how the cases were build and its subsequent impact are still matters for further design research.

Theme: Conflicts
Keywords: data visualizations, data activism, information design, collaborative communities.

1. Introduction

On April 4, 2016, Chilean President Michelle Bachelet pledged high priority for the construction of a bikeway along the bank of Santiago's Mapocho river. The initiative was first made public in 2011 by Pedaleable, a non-profit and citizen collective that started to organize the biking community in Santiago through non-authorized bike rides along the river's edge and a crowdsourcing campaign for data collection about the most popular and busy biking routes in the city and the poor state of its bikeways. The crowdsourced data was leveraged using mobile phones with GPS technology to trace the flows of bikers and the location, length and quality of the existing bike lanes. Data were visualized into a map using OpenStreetMap, and then published in the collective's website. The data gathered allowed Pedaleable.org to produce substantive evidence on how bikers and citizenship alike asked for better sustainable mobility policies in the city. The data and the visual artifact that represented it were multipurpose devices: for communicating and engaging and involving citizenship; for achieving dialogue between bottom-up social demands and the authorities; and for empowering the practice of using data as evidence.

Pedaleable.org is one of several current cases that illustrate new ways that citizens are taking action to meet their needs, reshaping both

the virtual and the physical urban space as they bypass the established institutions and authorities' often sluggish decision-making. These new forms of citizenship collectives, DIY citizenship (Ratto & Boler, 2014), civic initiatives and communities received different names in the "city making" (de Waal, 2014) and urban transformations especially in the United States and European countries. These actions can be considered as a new citizenship activism in which the emergence of technology democratizes the use of digital platforms for connecting and scaling up. Digital technologies improve the use of data for involving people to support causes and spread the collective action. The use of data in this type of activism is essentially collective because knowledge and skills become relevant in the context of the group peers (Milan, 2017). In this context, the relevance of data visualization emerges as the visualizations process and is also, and directly, a tool for community building (Manzini, 2015).

From the Information Design point of view there is much to say about the use of data for activism, advocacy and communication. People involved are not always experts in the matters they pursue neither experts manipulating data. There is a gap between them and the data available for turning into a supporting communicational artifacts for their claims. Identifying or even providing a set of guides for future data-activism could contribute to the knowledge of initiatives and advice to non-experts that want to leverage civic initiatives. This paper present 8 communication design strategies using data for activism through seven cases which were selected because of their use of data and digital platforms for activism. This paper is a first effort that pursues to put together the ongoing practices, identifying issues and compiling strategies for future data activism initiatives.

2. Data, activism and design

2.1 Context of data

The digital sphere has profoundly changed the way people access and share information. In the last 15 years the production of data has been exponentially increasing[1] and the most obvious reason is because of technology: as the capabilities of digital devices soar and prices fall,

1 According to the International Data Corp (IDC) the current annual data creation rates 16.3ZB (16.3 trillion gigabytes; they estimate that in 2025, the world will create and replicate a tenfold increase from the amount of data from 2016.

sensors and gadgets are digitizing lots of information that was previously unavailable. Data has gone from scarce to superabundant, bringing huge new benefits and positioning a techno-utopian view in which data are reliable and solid. Quantified self allows people to go through the process of self-knowledge through self-tracking with technology. Ubiquitous technologies also allow people to directly participate in the creation of data engaging with technology in new ways. The collective practices of building openly and without hierarchies on same communicational artifacts are examples on how the democratization of technologies are introducing new actors into the discussion on diverse social claims.

In the other hand, data superabundance led by technological devices carry big issues that are not evident to people[2]. There are no neutral data, neither its manipulation and transformations. Our data is extremely political because it could trigger representations of reality depending on who takes and manipulates them. They are raw material for drawing indicators according to the perspective of those who have them. From these representations of reality, decisions can be made encompassing society or part of it[3]. Calling to action through data implicates to be aware about data possibilities but also constraints.

2.2. Taking action using data as evidence

Activism is essentially about taking action on a matter seeking for social change. It is usually associated with political actions of protest in diverse

2 Such issues could emerge through questioning the sources: the origin and nature of data or how is been produced; about how is been gathered, stored and aggregated; who and how manipulated it; and what data is freely and openly available. Querying data nature and their manipulation is an active approach to use it.

3 Different initiatives are trying to advocate to awareness in this issues to citizenship. 'The Glass Room' project and 'Exposing the Invisible' are two examples of the work that Tactical Technology Collective performed since 2003 for raising awareness about privacy, digital security and info-activism. The Glass Room' is an installation space that seeks to promote awareness on the use of data. Presented by Mozilla and curated by Tactical Technology Collective, it was first released in New York City (November 2016) and later in London (October 2017). More information at https://tacticaltech.org/themes/privacy/the-glass-room/. Exposing the Invisible' is a web platform project who provides investigative tools and techniques for learning through short films, interviews and guides promoting people to uncover hidden information, expose corruption and bring the truth to light. More information at https://exposingtheinvisible.org/.

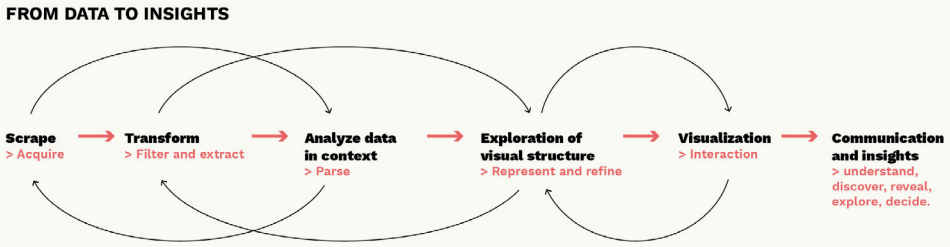


Figure 1. From data to insights. Phases on the process of working on visualizing data. Schema base on Ben Fry's Seven Stages of Visualizing Data published in his book Visualizing Data, 2008. Schema from the author.

areas[4]. This paper consider activism not only in its political connotation, but also in its sense of active, to take action about a certain issue or matter. Taking action entails change, and for this to happen there is the need of information about the social matter of concern, '*and much of it involves collective activity*' (Green, 2016). To take action from information is probably the main goal of communications campaigns on activism. But providing information is not the only way of interacting through activist campaigns. There are multiple paths for articulating information for taking action such as supporters to build up information (i.e. crowdsourcing experiences of individuals on participative maps), or participating communities to follow up how information is (i.e. platforms for crowdsourced reporting and monitoring malfunctioning public service, such as street lighting in bad condition on public spaces inside a neighbourhood community).

Using data as evidence entails a process through diverse phases of the activism communication in which activist are called to take action through it. Nonetheless today's use of data as evidence is a type of activism itself, in which people engage and empower with causes in new ways. People are not only call to take action after being informed but also during the process of using data (see figure 1). These steps constitute political actions in which designers and activists build up a political statement. From these data and its transformation process into information, it's decide which spectrum of reality are providing to their campaigns and

4 Despite the diverse areas of political action – such as politics, environment, gender, labour, social justice, economics among others – and of motives or purposes, activism nature is about action: on moving from one point to another, on transforming conditions on behalf of communities' welfare.

publics. The different phases on working with data constitute political decision facets of the process of building up evidence.[5]

2.3 Role of designers in activism communication

Information design is the practice of giving form to data so that the data become meaningful (DiSalvo, 2012). The process of data to become meaningful to a specific user (see figure 1) entails different phases in which designers have a relevant role. Data themselves are a raw material that could have different origins, nature and types; and could be shaped in diverse ways, becoming a process of political decisions. Those political-design decisions are part of an editorial process in which designers and the involved disciplines, decide which part of reality show for translating complex phenomenon to an audience in their context. The role of information designers should be interwoven with an ethical approach to working with data to ensure the protection and security on people's individual data and the transparency of their design process.

Given the proliferation of non-expert groups[6] of active citizens using data in their projects, and the pertinent role of information designers working with data, it's relevant to inquire: how could these practices be improved and what is missing? From the Information Design scope there is much to say: even if there already exist efforts for structuring the organic

5 Relevant work is being done on using data as evidence through *Stactivism* and *Data Activism*. *Stactivism* was coined by Bruno and Didier in 2013, puts together statistics with activism; is the use of statistics as a form of action, representing and giving a critical point of view on the construction of realities. *Data Activism* is a term coined inside the 'Data activism: The politics of big data according to civil society' research project based at the Department of Media Studies of the University of Amsterdam. This research identifies two types of data activism: re-active and pro-active data activism. The first one refers to citizens' resistance capacities to civil threats using technology; the second, to citizens taking advantage of the possibilities that data offer (for civic engagement, advocacy, campaigning). See http://data-activism.net/about/.

6 Active citizens are not always experts in the matters they pursue; neither experts manipulating data. Even if these new ways of using data as evidence for civic engagement are on an early stage of development, it is relevant to observe and inquiry on how the use of data for this purpose could be improved. Many successful projects on urban reshaping activism that are having an impact in society are not using data in their performance as a design component of their action. This does not mean that the data are irrelevant, but rather that the impact could be increased through new possible actions led by using data.

development of these groups, there is missing a practical and theoretical scope from the lenses of its communication. Identifying or even providing a set of guides for communicating through the use of data for citizen activism could contribute to knowledge of initiatives and advice to non-experts that wanted to leverage future initiatives. The hypothesis of this paper is that bringing together current practices and their identified issues with strategies to develop convincing data communication could improve them and scale their impact. This paper present 8 different design data strategies for exploring ways of narrating and communicating with data.

3. Design Data Strategies case study

For this research it was collected 25 projects that uses data with the intention to raise awareness and outline visions for change represented in diverse ways, not only through visualizations. These projects contained the following characteristics: a) Use of digital platforms and data in its communication design; b) Projects that seeks a social objective; c) Activists behind the projects could be a collective, research group, NGO; not private sector oriented. d) Non-profit projects. They have been systematically organized through the following variables for analysis:

- Introducing context
- type of data and source: official/non-official; digital born; crowdsource/self produced
- organization mission
- project objective
- user/audience
- Strategies and tactics: physical actions / interventions
- Complementary digital strategies

From analysing the case's variables are distinguish certain cluster (see figure 2). A first cluster is of mobile applications created for engaging citizens with their urban local environment through monitoring and reporting issues[7]. Even these cases comply with the previous selection criterion, they are performing a functional role in reshaping the urban space. A second cluster of bottom up initiatives are located in the border of the spaces of contest between dissent and contest. They pursue a new

7 Issues such as not well illuminated streets, cars parked in bike lanes, among others.

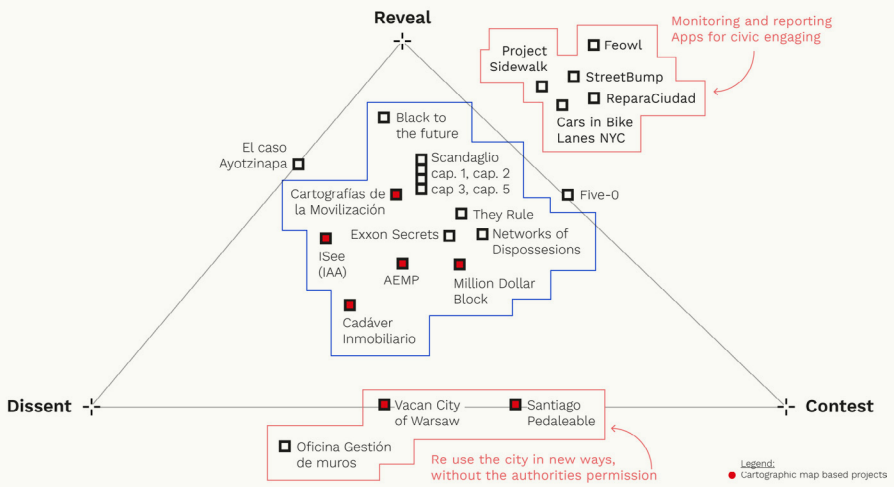


Figure 2. General overview of the 25 former cases and later positioning through the triangulation of dissent, reveal and contest. The 8 selected cases for analysis are positioned inside the triangle. Schema from the author.

use of the urban space bypassing the established institutions and authorities but seeking to dialogue with them for repurposing their environment. These civic initiatives are mostly seeking a practical change in people minds with a strong educative component. These kinds of clusters are relevant and part of trending approaches on civic engagement through the use of technologies. A third cluster is inscribed in the spaces of contest, sharing an agonistic point of view and seeking for a call to action from disclosure, exposing the invisible and opening black boxes on how things work. The design data strategies are based on 8 of these projects, since they are reacting to specific local issues seeking to dissent, reveal or contest[8] through novel narrative forms with data.

The following table present the selected cases of study[9]:

8 In his book 'Adversarial Design', DiSalvo proposed spaces of contest define by three key axes: revelation, contest and dissensus.

9 In order to present the design data strategies, recently completed projects were chosen which are a novelty for the research. Despite its ongoing relevance and validity, the One Million Dollar Block (developed by Laura Kurgan from the Center for Spatial Research. More information in: http://c4sr.columbia.edu/projects/million-dollar-blocks) project will not be used in the case study as it has been a referent since its publication in 2006.

Project	year	link	Organization
Anti Eviction Mapping Project San Francisco	2013 until date	https://antievictionmap.squarespace.com/	Anti Eviction Mapping Project San Francisco
Black to the Future	2016	https://montera34.com/project/black-to-de-future/	Montera34
Cartografía de la movilización	2016 until date	http://www.cartografia-delamovilizacion.cl/	(individual person)
Scandaglio cap. 1	2016	http://www.offtopiclab.org/scandaglio/molo/	OffTopic Lab
Scandaglio cap. 2	2016	http://www.offtopiclab.org/scandaglio/ancora/	OffTopic Lab
Scandaglio cap. 3	2016	http://www.offtopiclab.org/scandaglio/pedalo/	OffTopic Lab
Scandaglio cap. 5	2017	http://www.offtopiclab.org/scandaglio/baia/	OffTopic Lab

Table 1. Selected cases for representing the design data strategies.

3.1. Method of inquiry (what to look for)

Despite the diversity and uniqueness of each project, common steps are distinguished in the use of data to convert them into communication for taking action. This research seeks to provide insights in the journey of designing communication based with data for citizen activism engagement. These common steps or patterns could unveil design data strategies that give shape to data narratives. In order to identify these common steps or patterns it is necessary to observe two key aspects of each project: their context and the design decisions that shape them.

Context allows to build on meaning and the construction of publics. Local context includes the recognition of the area of intervention and purposes. Intervention areas could be diverse nus still if two projects shared the same area of intervention they could have diverse purposes as well and that would totally change their communication and way of achieving their objectives. From a communicational perspective, purposes could beelaborated through communication approaches and techniques (see table 2). These techniques are not exclusive of digital or non-digital being transversal to the means of use and communicative purposes.

Get the idea → expose	Get the picture → explain	Get the detail → explore
Juxtapose	Associations	Making data meaningful
Subvert	Connections	Putting together the facts
Invert	Remedies	Filling in the gaps
Materialise	Correlations	Unravelling connections
Compare	Portraits	Connecting the dots
Contrast	Perceptions	Piecing together the facts
Illuminate	Interactions	Uncovering tracks
Provoke		Working from the ground
Parody		
Intrigue		

Table 2. Communication approaches and techniques, extracted from Visualizing Information for Advocacy, Tactical Tech Collective, 2013. https://visualisingadvocacy.org/

On the other hand, the communicative objective is independent of the technique. The communicative objective is intrinsic to the purpose of the group of people who are carrying out the campaign. The technique will be adapted according to the social and cultural context of the group and its audience (see figure 3). The communication objective and technique elaborated in each case correspond to the target of the audiences they want to achieve.

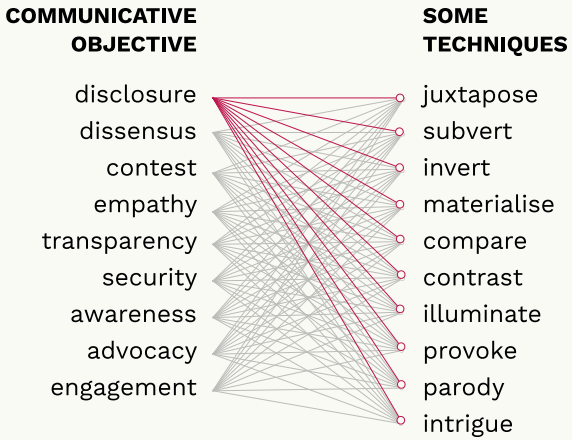


Figure 3. Schema (outline) exemplifying the possible combination between communicative objective and diverse techniques. The technique is adapted to the objective according to the local context of groups and audiences. Schema from the author.

The second key aspect to observe is the design decisions that could be inferred from each project. Working with data and giving it a visual representation involves design decisions on the political process of transforming data (figure 1) into insights: 1) which dataset use and how to work with it; 2) the visual model for representing the data; and 3) how the user would interact with the visual representation of data. Next, it's necessary to delve deeper into these stages of the editorial work that the designer faces when working on the representation of data to make sense of them:

1. **Dataset:** It is relevant to query the sources and the nature of data, how it was produced, combined and distributed. It is substantially different to work with data digitally born from social media that was scraped against the API policies of the services than working with official census data of past century that was digitized from physical records. Still, both are datasets but with completely different possibilities and constraints. Information is not always available about the sources from which visualizations of them have been built. This is already a design political decision on what to show or not.
2. **Visual model for representation**: The use of visual standards and variables (Bertin, 1969) bring significance to the data. In this stage, visual translation of data sharply acquire significance through aesthetical decisions. The visual elements chosen define the structure of the visualization, which may vary in its interaction.
3. **Interactivity:** Through interfaces, the user is able to manipulate variables and explore data, generating new representations based on their interests and desires (DiSalvo 2012, pp28). Designing the visualization of data is not only about representing it, but also about the expressive and animation attributes of it that could provide better understanding of the narration to the user. The interaction possibilities of the visual elements of the representation guides and reaffirms the sense of the narration through clicking, dragging, holding, moving, and highlighting, among other interactive features.

3.2 Design data strategies

Design data strategies are designerly means directed towards the construction of citizen activism engagement using data in an attempt to prescribe a course of action. Each design data strategy will be exempli-

fied through a case study explained in its context. This is a first attempt to draw a framework to guide the construction of possible stories that use data as evidence to promote engagement of people. The first five strategies will be presented through *Scandaglio*, a project created by OffTopic Lab: a collective that performs activism practices and bottom-up research which investigates the cracks of the political, physical and social fabric of Milan, Italy. *Scandaglio* is an ongoing and unfinished experimental project that seeks to understand how to go about finding ideas and open up new research questions, covering different topics of the city. Each chapter uses a different design *data strategy*.

Re-opening data

The first chapter of *Scandaglio* is about abandoned places in Milan, a city that has been through diverse urban transformations, bringing speculation and gentrification phenomena in certain neighbourhoods and areas of the city. The City Hall "opened" a map locating abandoned places in the city with nothing else that dots. They didn't provide any other information,

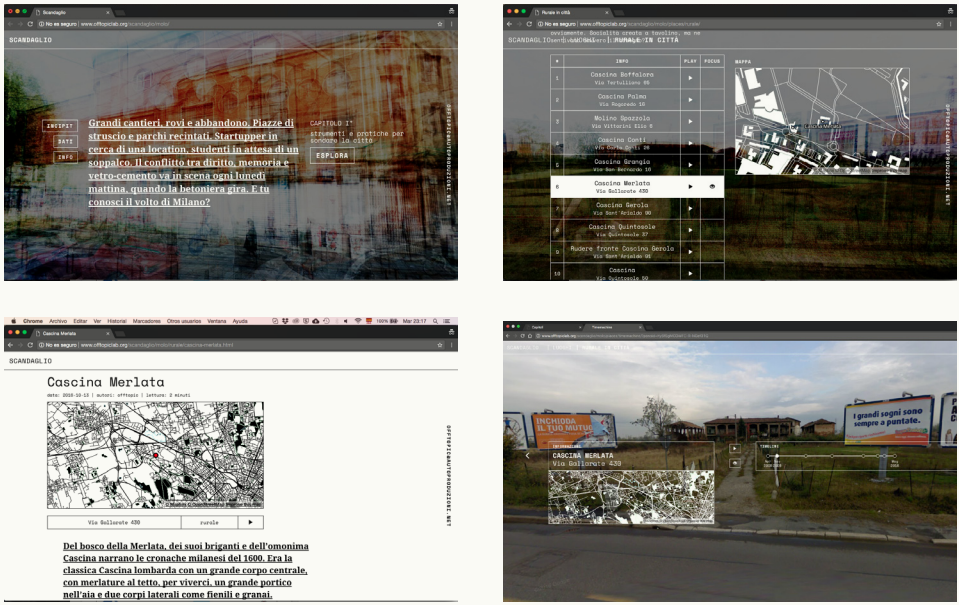


Figure 4. Screenshots from the website project http://www.offtopiclab.org/scandaglio/molo/ in four different interfaces of the first chapter. The bigger image shows the timeline interface for exploring the analysed areas, former 'dots on the map' provided by Milan City Hall. Screenshots retrieved on May 17th, 2017.

such as type of place, area size, etc. This could be called sterile open data. OffTopic Lab downloaded the data and converted the file to make possible to use it in open platforms. This action allowed them to combine it with other layers of data for free analysing. After this first step, the next question was: What else is it possible to see in these data? Taking Google StreetView images and using the timeline service that they provide, it was possible to dive through time and see how much these abandoned places had changed. By clicking over the years available in the timeline, the user could directly see how places changed through time. Users could bring forth their own conclusions about cases of clear speculation in some areas of the city, especially during the universal exposition Expo 2015.

Through different categories of abandoned places, it is possible to explore detailed information about some of them. The exploration deepness is possible thanks to the investigation performed by the collective that selected areas considered strategic for the analysis and knowledge of the speculation phenomenon in the city. This chapter re-opened the *black box* of the Milan City Hall 'open' data and closed artifacts such as Google StreetView, re-opening data for new possible analyses and queries.

Remixing data

This design data strategy is based on the second chapter of *Scandaglio*. During politician Beppe Sala's candidacy, he promoted the project idea to reopen the Naviglio, the city's underground water canals. OffTopic investigated the meaning of such a big investment in the city. Since this was only a candidate's promise, at the time the research was done there was no data about the characteristics of the project, only certain superficial cost estimates and the trace of the underground canals' location. The big challenge was on how to talk about a project that hadn't started and which were its implications?

The strategy was to take a picture of today's situation to understand the possible future changes. *The purpose of a projection is to make apparent the possible consequences of an issue* (DiSalvo, 2009. pp 53). OffTopic structured a narration with data that could help to take the actual picture of the project at that moment, strategically dividing the route where the underground canals might pass through in four hypothetical areas.

The next step was data extraction from other sources of interest and its subsequent remix: renting prices, public services and commercial services using: *OpenStreetMap* for retrieving geo-referenced data of commercial services; from *Piano Regolatore Territoriale di Milano (PRT)* retrieving

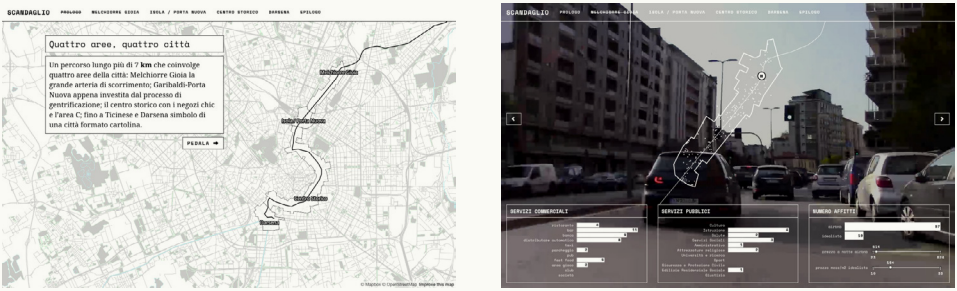


Figure 5. Screenshots from the website project http://www.offtopiclab.org/scandaglio/ancora/. The upper image presents the narration structure divided in the four hypothetical areas proposed by the collective; the other image shows the remixed layered interface: geographic layer (map); emphatic layer (background video); and data layer (boxes with commercial and public services and rental indicators). Screenshot retrieved on May 17th, 2017.

data about public services; and scraping a company for buying and renting properties in Milan, and *Airbnb API, to obtain* rent prices as indicators of how each area was valued. The scraping and refining operations related to data were not always linear and needed more interim steps. This is the case of retrieving data from the "public and open" data of *PRT:* data were available in closed tables in PDF format, which was hard to reutilise.

The empathic narrative structure in this chapter was one of the mainly matters. Given that the project was about a promise-project, it was important to appeal to the empathic characteristic of how citizens perceived their city at that moment and its possible future. The user was invited to ride a bike along the route in which the underground canal goes underground. While a user is 'riding' it, it's possible to see three layers on the screen:

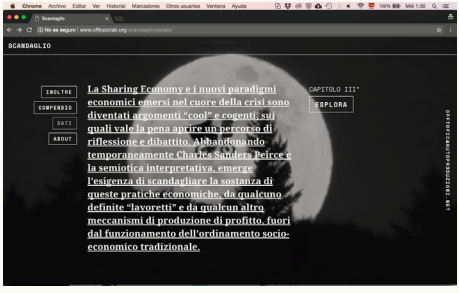
- Map: Geographic layer.
- Video: Empathic layer to show how it is and how much the user can recognize the area.
- Boxes with indicators: Data layer of commercial, public services and rents.

Remixing data with emphatic and geographic layer allowed the creation of a current reading of the city. The data were collected with a logic of being remixed so to give an integral and not partial idea of how the city is at that present time.

Data anonymization and data macro narratives

These two design data strategies will be presented through the third chapter of *Scandaglio,* which brings a criticism and awareness debate to sensible issues occurring in technologized cities such as Milan: score systems in which citizens have a profile that is constantly measured and evaluated. This chapter took the case of the one of food delivery bikers company operating in Milan. The riders have a type of contract that doesn't protect them properly and works under a score system based on their profile measuring (how fast a bike rides, availability, and score made by the restaurant, among others) in which basically an algorithm gave them instructions to take the food rom one spot to another. This could be seen as a very effective work system, but it's completely forgetting about social issues and work rights.

For this chapter, the collective was able to retrieve a very sensible database about the riders. The main idea was to communicate about how this system works, and not to reveal personal individual data of the workers. Data detail not always brings to light the best results. The strategy was to aggregate data in order to present hypothetical cases of two riders using the metaphor of a race. The aim was to face off two possible situations, revealing what it means to be a rider. Through a scrolling interface, the user can control the speed at which time passed during the riders' routes. Beside each rider you can see a "scoreboard" (in allusion to a videogame) in which they are gaining kilometres, the amount of dropped deliveries and the earned money. Users are invited to compare and conclude how tough it's being a rider.



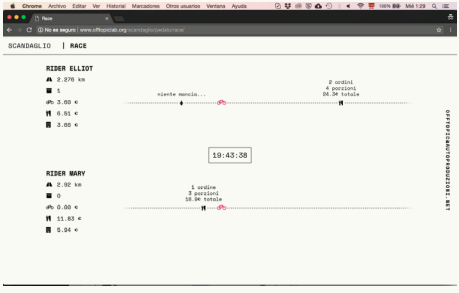


Figure 6. Screenshots from the website project http://www.offtopiclab.org/scandaglio/pedalo/ retrieved on November 2016.

Micro narratives

The *Tarjetas Black to the Future* project was developed by Montera34 after the leak of expenses performed by the Caja Madrid-Bankia managers using 'black credit cards' for their personal expenses during 2007. These cards were opaque for the Treasury of Spain and used money from the public budget. A Twitter bot (@BlacktotheFuture) tweeted every time one of the directors spent money using the black cards 10 years prior. People who follow the account could receive a Twitter notification of one of these stories.

The project's aim is to reveal the cheekiness of using of black-not transparent money by the authorities through a "in a day like today, 10 years ago" narrative, which helps people to realise the lifestyle and irresponsibility of their actions. Dosing the contents of the leak in a time frequency frame that the audience could associate to everyday life actions, helped to increase their awareness of the crime. The choice of Twitter as the medium increased the "everyday life" perception of a crime that happened 10 years ago as something normal. Instead of analysing aggregated data, Montera34 chose a different approach to data: small data in doses to reveal the silent crime (small data for mini narratives in a single tweet dimension).

Is this a data visualization project? In a way, yes, it is, because choosing Twitter as an output involves visual and interface variables. The leak takes the shape of "another everyday tweet", appropriating the features



Figure 7. Screenshot of the twitter account @BlacktotheFuture retrieved on January 23rd, 2017.

of the medium. The appropriation of a social communication platform is a subverting strategy that is only possible in the digital sphere. Answering to "how the digital could enhance physical action", this project is an example of how data take form virtually into our daily imaginary, taking distance from being just "data from the past".

Designing transparency of data

Allowing audiences to explore the evidence for themselves makes it possible to find the sense and meaning of it. This design data strategy is about opening the design decisions behind the editorial work on data. The process of designing transparency of data is different from designing data transparency. The difference remains in the design of a process that will be open and could be replicated by others in the future. Basically, it is designing for others to replicate, to modify – the very core idea of openness. *Scandaglio* has the motivation to be replicated and for this reason it's an open artefact. Each chapter approaches this strategy explaining the different design decisions step by step through links, images and a cheerful text explanation, also extending and leaving the project's coding in their GitHub repositories.

Creating visualizations involves a range of decisions about data, representation, and interaction. Making the decision process transparent

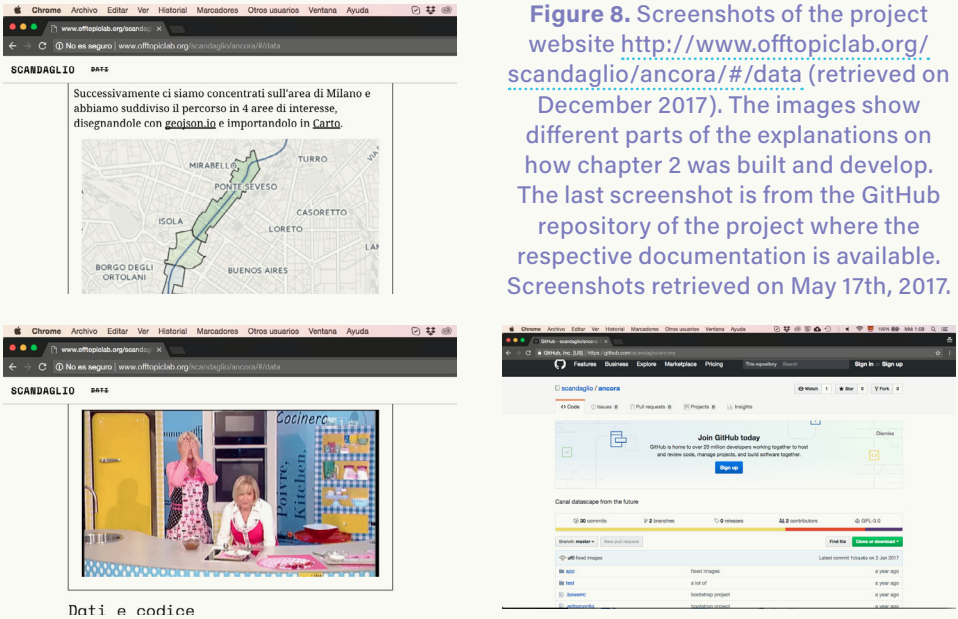


Figure 8. Screenshots of the project website http://www.offtopiclab.org/scandaglio/ancora/#/data (retrieved on December 2017). The images show different parts of the explanations on how chapter 2 was built and develop. The last screenshot is from the GitHub repository of the project where the respective documentation is available. Screenshots retrieved on May 17th, 2017.

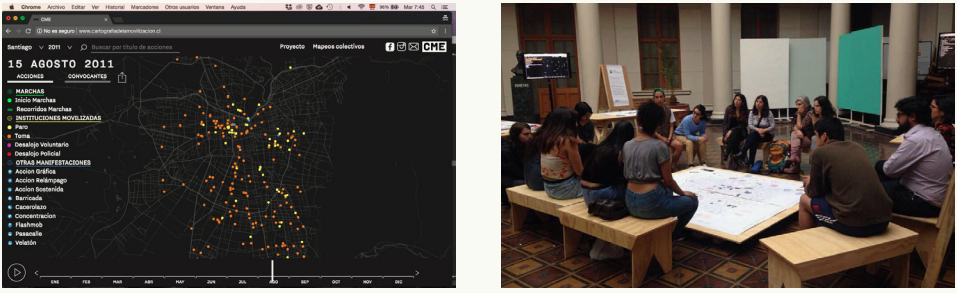


Figure 9. Screenshot of the project website http://www.cartografiadelamovilizacion.cl/ (retrieved on December 2017) and image of the physical encounter 'Laboratorio de Mapeo Colectivo' held in Santiago de Chile, October 2017 retrieved from http://www.cartografiadelamovilizacion.cl/mapeos/.

to the public is a way to establish trust between visualization creators and viewers. Several times users have a hacker instinct, seeking to open *black boxes*, and for the same reason this type of projects should open their own boxes. The *Github* platform is a good example of today's openness and sharing among the developers' community.

Crowdsource data

Cartografía de la Movilización (Cartography of educational demonstrations) is a documentary project that showcases on a map all events that happened during Chile's upper education protests in 2011 in the cities of Santiago and Concepción[10]. That year high school and university students lead a nationwide demonstrations in Chile, considered by several experts as the most important mobilizations of recent years and one of the largest since the return to democracy after Pinochet's dictatorship in 1973–1990. Students claimed for a reform in the educational system because it promotes private education at high tuition costs and at low-quality levels. The movement was strong enough to bring to the fore the discussion about changing the educational system.

The project invites people to add information and evidence about the different types of demonstration during that period. The map translates analogue processes into a database of happenings, public performances, protests and occupation of public buildings. The project aesthetics is expressive and non-neutral, since they represent the voice of revolution-

10 The first mobilizations started in 2006 with the "Penguin Revolution" (students are so popularly called because of their black and white uniform).

ary collectives, but it also had the need to deal with academic and political bureaucrats. The map is a strategy itself for narrating the social manifestations of this period.

There are many projects related to the construction of participative maps when referring about mainly crowdsource data. This case is used as an example of participative mapping because this process makes possible to document the memory of political events in the territory. It is about locating on time and space ephemeral actions that when put together they shed light to the complexity of the upper education conflict in Chile. The project connects with a series of activities that engage people with actual controversies related to the public system and society, such as gender unbalance and violence in the educational system. It is not only about a map and its participative process of construction, but it is also about promoting reflection on new digital and analogue tools through physical encounters.

Data-action

The Anti-Eviction Mapping Project San Francisco (AEMP) is a radical data-visualization, data analysis, and storytelling collective documenting the dispossession of San Francisco Bay Area residents upon gentrifying landscapes[11]. The mapping is performed by the crowdsource data collection through an online survey that volunteers compile. In addition, they use official governmental info about landlords and speculators.

Through digital maps[12], oral history work, film, murals, and community events, the project renders connections between the nodes and effects of new entanglements of global capital, real estate, high tech, and political economy. It studies the displacement of people but also of complex social worlds as certain spaces become desirable to such entanglements. The AEMP's interactive maps depict the rise and spread of evictions by

11 California's Ellis Act (decreed in 1980) provide landlords a statutory right to exit the rental housing business. Elli's Act evictions first ten years were rare, until the late 1990s when property owners in San Francisco Bay began using it to evict tenants. From 2001 Ellis Act evictions peaked in 2001–2003 but remained high until 2008. Between the housing market crush evictions decreased but rose sharply again in 2012–2013 prompting protests and media attention. The collective started mapping evictions in SF Bay Area in 2013 and has continued to do so until today, expanding the project to other areas (Alameda County, California, for instance).

12 The more than 100 interactive maps are mainly performed using Leaflet and D3 libraries, CartoDB and OpenStreetMap. Besides the map construction, they use Crowdmap.com platform for comments.



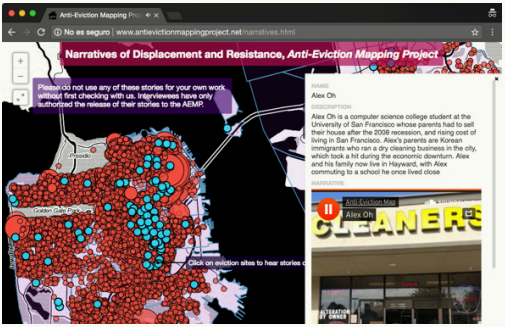


Figure 10. Screenshots of the 'Narratives of Displacement – Oral History Map' (retrieved from https://www.antievictionmap.com/oral-history-map/, retrieved on December 2017) and picture from the Clarion Alley Mural Project (retrieved from https://www.antievictionmap.com/mural-in-clarion-alley/, retrieved on December 2017).

property owners through time. The user can click on the play button in order to start the timeline animation, which shows a chronological sequence of evictions. Each eviction is represented by an exploding marker having a rhetorical force that is easy to recognise.

As a collective, *they strive to make the often obscured mechanisms of material, cultural, and affective displacement palpable*[13]. The AEMP is an example of how information visualization (through data visualization on maps and data stories), organise collective action and crowdsourced practices to empower citizens through new evidence. The visualisations and use of data allow them to create a space for dissent, reveal and con-

13 Extracted from the official website https://www.antievictionmap.com/about/ retrieved on November 2017.

test, situating the collective as a relevant actor in the conflict of displacement and gentrification.

The AEMP combine three key spaces of action mixing data and stories:

1. Data visualised on maps. These maps are created through the participation of a vast amount of people. They are not only '*dots on a map*'; they are designed with interactions that allow users to explore and analyse what lies in between the dots.
2. Storytelling + data: They are not interested in reducing people to their evictions, and thus instead focus on the intimacies of personal relationships to shifts in spatiality as processes of gentrification unevenly unfold.
3. In the project there is a continuously passing through the spaces of data in the physical space of the city, and of human stories in the digital space of the map. This project is alive in both digital and physical spaces. The integration of both types of aspects (data and human stories) in the same spheres are key characteristics of its success.

4. Challenges and conclusions

This research is a first attempt to draw a framework to guide the construction of possible stories that use data as evidence to promote people's engagement. The cases exposed testify the presence of today's data culture in which access to data, instruments and tactics is within everyone's reach. The non-experts but experienced citizens have at hand the possibility to bring evidence and create spaces of contest. For these means it's necessary to leverage effective communication to improve the debate and dialogue that we could bring to these spaces of contest.

Information design is only one part of the tip of the iceberg; we need to work side by side to leverage better and effective communication to propagate our ideas. The challenge designers, developers, activist – and society in general face – is to bring evidence in meaningful ways so that we can communicate our views. Making good use of data is one thing, but using data in an effective way is quite another.

Other challenges that remain for further research is to leverage methods for measuring the impact of communication designed with data for citizen engagements and monitoring its ongoing process. This research found that most of the explored cases didn't have proper records or infor-

mation about their process and impact on their target audiences. Observing the post effect of these means of communications could allow us to learn much more about good and bad practices. However, the lack of records of processes and the little knowledge or sharing of them and their impact is a challenge that we must alter to open the black boxes of data.

Education in the use of data is a societal challenge that involves all segments and areas of society. From the Information Design arena, that is necessary and urgent, moreover in a society surrounded by data. Nowadays access to data is not an issue, but the challenge is to bring lectures from it, analyses, insights and then transform them into something meaningful. Education on data could be a key factor demystifying the ongoing blind trust on data. In order to take action through data there must exist a close relation between the digital and the physical: engagement and participation cannot merely be digital. They must integrate the physical dimension among civic initiatives participants.

María de los Ángeles Briones
PHD candidate, Politecnico di Milano,
DensityDesign Research Lab,
mariade.briones@polimi.it

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The Use of Design Thinking in a Multidisciplinary Context

Collaborating with a Start-up Project

Pelin Efilti, Özlem Gürtunca, H. Hümanur Bağli, Ozan Soyupak

Abstract

Design thinking is a well-liked strategy that was derived from the approaches of leading philosophers and design firms as a multidisciplinary method to understand people in detail and satisfy their needs properly. Innovatively, design thinking approach can be perceived as a catalyst to the development of better solutions, products and/or services. Although this method has flexibility in application, it should include examination, intervention and implementation phases based on the iterative nature of design thinking. In this study, design thinking method was constructed on a multidisciplinary practice within the frame of a graduate level course of Design Thinking. Within the context of this course, design-based master students and entrepreneurs who came from the engineering and business backgrounds were matched to work together. This study examines one of the collaborations which consists of a start-up working on a software platform to serve automotive sector. The purpose of this collaboration was to define deficiencies and problems also to find proper solutions for the start-up project with the help of applied research and idea generation methods.

In this collaboration, many limitations were faced among with challenging conflicts. This can be considered inevitable when collaborating with differing stakeholders. Varied academic approaches and discrepancies of experience, contributed to the unpredictable nature of the project's progress. But this is to be expected when using the unstructured characteristics of the design thinking approach. However, these disagreements were overcome by virtue of the transformation and combination of the methods that enabled through the flexible potential of design thinking in an effort to create a shared language among stakeholders. The language constructed an effective interaction between stakeholders and also led to a learning platform. The research and idea generation methods used in this study are the collocation of a business model canvas study constructed as a brainstorming session, a field research in an automotive bazaar, a group meeting including role-playing game, an interface analysis also a card sort method. The provocative and creative usage of the methods led to the exploration of productive knowledge for the project. Design thinking mindset revealed the inspirational potential of multidisciplinary collectivity and offered a multilayered experience for stakeholders that led to the comprehen-

sion of the entire picture in detail. Lastly, this paper presents the outcomes of a design thinking process with not only the whole encountered conflicts but also the collaborative and experimental approaches to overcome these conflicts.

Theme: Conflicts
Keywords: design thinking, design thinking methodology, multidisciplinary collaboration, interdisciplinary conflicts, start-up collaboration

1. Design Thinking

Based upon its derivation from the perspective of leading philosophers and the "design work for business" (Brown & Watt, 2010, p.29) approach of design firms, design thinking has gained its independency from "the thought processes of designing" (Johansson-Sköldberg, Woodilla & Çetinkaya, 2013, p.121) in the recent past. The reason is that both theorists and practitioners have fostered design thinking mindset "based on widely different ways of viewing design situations and using theories and models" with the discussions and interpretations from varied academic disciplines (p.521). This multidisciplinary contribution also paves the way for shaping creative partnerships with the arisen of "collective consciousness" (Dorst, 2011, p.521). The fact that design thinking mindset representing "a simplified version of designerly thinking" (Johansson-Sköldberg, et al., 2013, p.123) is an adaptable thinking model into different fields and frames with the encouragement of interdisciplinarity.

On the basis of a collaborative understanding, design thinking is utilized to comprehend the uncertain situations of the societal challenges (Lindberg, Meinel & Wagnar, 2010) that "are grounded in the client's or customer's needs" (Brown & Watt, 2010, p.29). This is the indication that design thinking mindset is constructed on a consumer oriented frame and a competency to develop the forthcoming outcomes (Oglilvie & Lieatka, 2011). While the implementation of the methodology is moving through the acceptance of human-centered approach, also the integral way of thinking (Lindberg, et al., 2010) is required to apprehend the entire picture in detail so as to overcome the difficulties and satisfy the needs of consumers effectively.

Despite design thinking has gone beyond the intellectual attitude of design, this methodology reserves the "disruptive and game-changing

potential" of design (Brown, 2009, p.7) thereby gains advantage from nonrestricted and multifaceted problem solving fiction of designing practice. In spite the fact that the nonrigid potential of this methodology adapted for specific needs, problem solving perception of design thinking is based upon the examination, intervention and implementation phases essentially. These three umbellate headings present the sections of an iterative loop and apply to particular "spaces", such as empathizing with consumers, defining the problems, ideating the solutions, prototyping the ideations and receiving the feedbacks with testing. Brown and Watt (2010) touched upon the iterative nature of design thinking process and clarified the workflow as:

> "The design thinking process is best thought of as a system of overlapping spaces rather than a sequence of orderly steps. The reason to call these spaces, rather than steps, is that they are not always undertaken sequentially" (Brown & Watt, 2010, p.30).

Design thinking process contains a mutual interaction between the revelation of difficulties with their formulations and the unification of integratingand enacting phases (Lindberg, et al., 2010). This interplay is proceeded via the extensive investigations directing the iterative process through verification or reformulation of the previous inputs with the help of obtained information "within a set scenario of value creation" (Dorst, 2011, p.524).

The creative intersection of the collaboration of various academic backgrounds and the repetitive proceeding sets the innovation free as a catalyst to the development of better solutions, products and/or services (Meinel & Leifer,2010). Due to the reason of the discovery potential of atypical (Lindberg, et al., 2010), design thinking mindset is appreciated by businessmen nowadays (Brown, 2009).

2. Design Thinking Education

The literature of design thinking has been fostered by both theoretical studies also the sources providing practical knowledge through some case studies (Johansson-Sköldberg, et al., 2013) uptill now. Nowadays, because of the strategical importance of design thinking in different sectors, various design firms, foundations and universities offer online courses or periodical trainings with the aim of teaching the basic princi-

ples of this methodology. These courses generally provide practitioner-oriented data sets that clarify the usage of design thinking methods within the restricted theoretical frame. Today, design thinking strategy associated with innovation is undertaking an "experimental approach" that ensures a "learning by doing rather than through theoretical pondering" (Skogstad & Leifer, 2010, p.26). Besides, the education of making innovation is embraced within the scope of different academic institutions; also this process is experienced through multidisciplinary collaborations in these organizations(Beckman & Speer, 2006). On the other hand, design thinking process was visualized by Beckman and Barry (2007) as an interplay between theoretical and practical stages of the process that goes back and forth between acquiring knowledge through experience and transforming them into non-physical representations.

In this paper, a multidisciplinary collaboration is explained as a process that sets an example for learning through doing with the guidance of theoretical knowledge. While the frame of this study was defined as a digestion process of design thinking mindset for stakeholders, some expectations about concrete outputs from this experience were appeared by the reason of realistic nature of the collaboration.

3. The Frame of the Design Thinking Course

In this study, design thinking methodology actualized within the frame of a graduate level course of Design Thinking was constructed as a multidisciplinary practice. Within the context of the course, a "collectivity not chosen" was built between master students and entrepreneurs to work on the start-up projects of entrepreneurs. This course aimed a realistic collaboration expected to define deficiencies and problems and to find proper solutions for the start-up projects with the help of applied research and idea generation methods. The collaboration examined in this paper was performed in virtue of the interaction between the design-based master students as design researchers and the entrepreneurs who came from the engineering and business backgrounds. This multidisciplinary study centered upon a start-up project on a software platform to learn the fair price of secondhand cars.

In this collaborative process, the main contribution of the course was its 14-week period of time that enabled productive interactions between stakeholders and revealed effective outputs. During that time, except the special meetings among stakeholders, course meetings were arranged

regularly each week. This regularity provided to be followed and guided by instructors and classmates with the personal thoughts and profitable critiques. It can be said that this collaboration was not only conducted between the master students and entrepreneurs but also affected by the discussions occurred in the course environment. Second of all, while the collaboration between stakeholders that took place out of the studio environment was shaped through applied research and idea generation methods; and also the content of course supported this practitioner-oriented experience with the theoretical background of design thinking methodology.

4. The Use of Design Thinking in a Multidisciplinary Context

In this collaboration, many limitations were faced among with challenging conflicts. This can be considered inevitable when collaborating with differing stakeholders. First and foremost, design thinking methodology had not been experienced by both sides professionally before. The lack ofexperience led to the blind proceeding that was clarified step after step according to the obtained data and the necessities of the project. However, while this multidisciplinary study revealed many disagreements between stakeholders, the lack of experience and the uncertain nature of the project were overcome via the potential of the multidisciplinary diversity and interdisciplinary interaction. Besides, with the help of the theoretical guiding, the process was discussed and conducted via examination, intervention and implementation phases based on the iterative nature ofdesign thinking. In a sense, this mindset provided a multilayered flow among examining, analyzing and testing spaces.

Even though the multidisciplinary contribution of design thinking can not be underestimated throughout this collaboration, another conflict arose from the sharp contrast between the stakeholders' academic backgrounds reflecting on the perception about and the implementation of doing research. To this respect, design thinking process was designed with the help of the transformation of methods so as to generate a familiar experience for stakeholders or improved through the provocative combinations to foster the next step.

On the other hand, coming from various academic backgrounds and having dissimilar terminologies required a language adaptation for a common ground not only to establish an empathic comprehension but

also to describe the same incidents and allow the exploration of innovative ideas. While shaping and revising this common ground were a continual arrangement, interaction between stakeholders embarked upon with the converging of the idea generation tools in an attempt to manifest "a shared language" (Osterwalder & Pigneur, 2010, p.12).

Eventually, the provocative and creative usage of the methods led to the construction an interactive communication between stakeholders and the exploration of productive knowledge for this project. The research and idea generation methods used in this study are the collocation of a business model canvas study constructed as a brainstorming session, a field research in an automotive bazaar, a group meeting including role-playing game, an interface analysis also a card sort method.

4.1 Examination

Brainstorming as "a semi-structured, team-based method of rapid idea generation" is a very significant mechanism for the managements (IDEO U, n.d.) and used to trigger innovative ideas. Besides, the reason of including a collaborative process, brainstorming activity enables developing the empathy and enhancing the innovative interaction between stakeholders. However, the entrepreneurs' lack of knowledge and practice about brainstorming approach would make difficult to manage this process. It was inevitable that brainstorming approach was in need to be transformed or combined with secondary ideation method to guide both entrepreneurs and design researchers during the idea generation process.

When discussing on the previous studies, the entrepreneurs mentioned about their experiences on business model canvas at the beginning of the project; however, this canvas was not improved thereafter. A business model canvas is utilized to "describe the rationale of how an organization creates, delivers, and captures value" (Osterwalder & Pigneur, 2010, p.14) for a professional planning chart; besides, enables to test this planned workflow with "thinking through some key aspects of a social enterprise, service, or business" (Design Kit, n.d.). This study generally has a systematical approach from making decisions about the values of an organization to implementing and revising them with new findings. Moreover, the applied practice of canvas study enables the comprehension and innovativeness (Osterwalder & Pigneur, 2010) by virtue of the creative reflecting opportunity of visualizing like brainstorming ap-

proach. In the context of this study, business model canvas was not only formed to visualize workflow and get used with the combination of brainstorming approach to define the major problems also generate creative ideas and opportunities about the project but also shape a common language between stakeholders. For the creative attitude of this hands-on study, the process of idea sharing with the guidance of business canvas revealed the uncertainty of the target groups and led to the occurrence of new consumer segments, relationships, revenue sources even services.

The conception of the new elements and opportunities requires to be observed and examined in detail to test their accuracy and implementation in real life. This comprehension can only be realized by interacting with the people identified as consumers and understanding their daily usage and requirements for price searching activity. In this point, a conflict was occurred between stakeholders with the claim of the entrepreneurs that they had already known the needs and desires of consumers. Moreover, the stakeholders built a consensus about the need of face-to-face interaction with identified consumer groups; thereby, collecting first-hand information to comprehend their requirements and their thoughts about car pricing process. For this reason, to reach the extensive consumer profile a field research was conducted into a secondhand car bazaar.

A secondhand car bazaar that has the proper location and easy accession in the city where the research was conducted was visited with design researchers and entrepreneurs. The general structure of the bazaar was a huge terrain that was separated two parts invisibly. In one of the parts, there were several automotive stores that were marketing secondhand cars and another part was reserved for individual and commercial sellers.

In the field, unstructured interviews were conducted with 10 people in detail. While some of the interviewers were individuals interested purchasing or selling, also the others were the owners and employees of automotive stores. In this point, the major difference between stakeholders was arisen from having different research approaches. Whereas the entrepreneurs wanted to learn whether the software algorithm was available for purchase, researchers' expectations from the field research was to comprehend the research channels of users and their tactics due to generate or learn the fair prices. To find a junction point between divided expectations among stakeholders, and also to overcome the complexity

of face-to-face communication, researchers undertook the responsibility of communicating with people in accompany with the entrepreneurs. Therefore, interviews were conducted through the questions about the research sources also their view points about reliability of price searching machines constitutively. Above all, these interactions helped to understand that an adaptation for usability of the algorithm was in need.

Also, according to observation at least one written page describing the car's features like its model, price, engine power, number of kilometer consumption, accessories or internal features, any damage or accident free reports even payment opportunities and the fuel type was posted on the windscreen of the car (Figure 1). Even though the coding design of software platform was almost completed, entrepreneurs had not completely known that which kind of features of a secondhand car affect the car price. Therefore, these field information were collected by photographs also analyzed one by one and compared with the previous plan. For instance, while entrepreneurs were constructing a searching motor which was processed with the inputs of model, kilometer consumption and engine power previously, after the analyzation of the field data, it appeared that fuel type, data about damages or proofs for accident free



Figure 1. A photograph from the automobile bazaar shows the written pages describing the features of secondhand cars

and interior features of the car had an impact on the car price directly. By this way, new features were adapted into the software system to satisfy the requirements of users.

4.2 Intervention

As a result, some conceptualized segments of the canvas study were examined via a field research. Data analyzation process was proceeded with verification, rectification and elimination decisions between the constructed canvas organization and the field findings. These complement implementations canalized the process and provided raw data for the next method operations. In this manner, the rest of the study focused on specifying the consumer groups according to obtained information from the field and shaping the proper interface for the target groups among them.

The next step of the process was divided two parts with the guidance of field findings. While possible target groups were generating and testing in reference to their personal characteristics, needs also desires; in parallel, an interface analysis that aimed to picture the interface parameters of rivals and familiar searching motors were performed in virtual setting.

With the rearrangement of consumer segment on the canvas sheet, the six possible consumer profiles were specified after the comparison of previous concepts and findings. The descriptive definitions of personas fostered the data set of group meeting arranged with the adaptation of role-playing activity in the ideation phase of innovativeservices.

The group meeting was conducted with 15 people in the Design Thinking Master Course by the moderation of researchers. Through the instrument of definitional information, participants took the place of these possible consumers respectively. The sharing dynamic of the group interaction triggered each other and led to reveal the unforeseen requirements of and especially services for the personas. On the other hand, participants asserted the expectations of the characters from the price searching platforms and developed ideas to solve their problems.

Synchronously, an interface analysis was performed in virtual setting to picture the usage parameters of rival and familiar searching motors. Therefore, nine different websites defined and analyzed to reveal the common parameters and deficiencies of entrepreneurs' software interface. Each platform was analyzed in three steps. Sequentially, the initial

screens, homepages and the operation of the searching motors that show fair prices were analyzed and visualized with particular illustrations (Figure 2). The main purpose of this analyzation was to explore the common characteristics of these platforms between each other; and also to comprehend the deficient points, differentiations and strengths. While this analyzation was carried out by design researchers rather than a collective study, the obtained data played a crucial role for the next steps. Besides, the data was documented on a chart as parameters already provided by the algorithm also integrable options. This representation provided an effective communication between stakeholders through not only a statistical information but also a visual expression.

Eventually, the obtained data from the meeting was edited and purified from useless and unrelated information also analyzed with regard to documented chart of interface analysis due to find out the similar outputs of these studies and make deductions about particular target groups. While the common outputs of the examinations disclosed the basic needs; on the other hand, unforeseen and specific features also expectations provided the essential differentiation from rivals. The completion of user profiles with their personal characteristics, expectations, specific services for their needs even the inferences that would meet their desires caused the elimination of various target groups and the concentration on

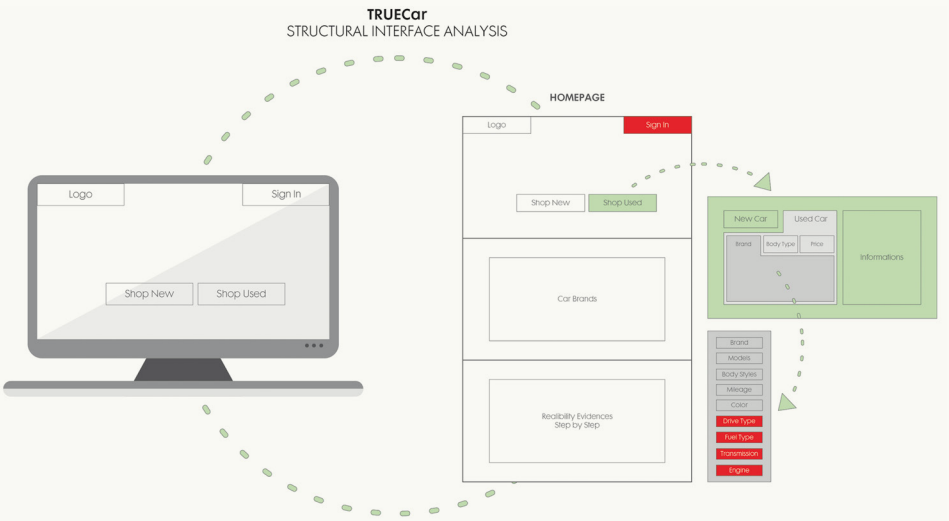


Figure 2. The usage of an interface that analyzed in three steps was illustrated by design researchers. Specified parameters were emphasized.

a specific consumer. To test the constructed profiles and inferences, also to prototype the interface tools, obtained parameters were examined via card sort implementation.

4.3 Implementation

Card sorting method is an applied technique to provide information about the usage practices of people (Courage & Baxter, 2005). Initially, it is a way to learn the most considerable needs of consumers (Design Kit, n.d.); in the second place, it is a designing practice conducted by consumers through grouping some fictional cards with regard to their selections. Designing practice contains two types of grouping activity as open and closed. While open card sorting is approached without a pre-defined categorization and entitlement of cards (Affairs, 2013), closed card sorting requires a card separation according to pre-defined groups (Lewis & Hepburn, 2010).

In this collaboration, card sorting method was experienced in an attempt to explore the possible functions of the interface with the potential users. Therefore, the eighteen units among the obtained and analyzed parameters were transferred onto cards with proper illustrations, also approximately 15 minutes meetings were conducted with the defined users. These meetings performed with 19 people were approached in two phases. Firstly, participants collated the cards according to order of importance (Figure 3), and then, categorized them by naming while think-



Figure 3. A user was sorting the cards according to order of importance.

ing aloud. Consequently, in the context of this study, the card sort method was utilized not only for prototyping and testing but also as a learning source to foster previous decisions and direct the layout of interface.

The findings of card sort study were analyzed both qualitative and quantitative techniques. Initially, the collocated cards were graded from the highest to lowest for each participants and a numerical importance line was generated among them. Secondly, a group matrix was formed with reference to the categorizations of users; besides, the narratives of participants were documented and discussed between stakeholders.

5. The Reflections of Design Thinking

Apart from the designing activity, design thinking methodology offers a thinking model that can be adapted by different academic fields with a collective motivation. The creative intersection of multidisciplinary approach and iterative problem solving mindset of design thinking within the boundaries of human-oriented framework enables innovative steps to the development of better solutions, products and/or services.

In this study, design thinking practice was actualized in the context of a graduate level of Design Thinking Course with an incidental collaboration between design researchers and entrepreneurs. Firstly, the multidisciplinary collaboration between stakeholders was canalized and supported by the contribution of this course with the theoretical knowledge. Secondly, stakeholders got a chance to transfer this academic knowledge to the field with applied research and idea generation methods in comparison with the online trainings and theoretical lectures.

During this collaboration, the challenges and conflicts were overcome by virtue of the transformations and combinations of the methods. The provocative and creative usage of the research and idea generation methods enabled via the flexible potential of design thinking in an effort to create a shared language among stakeholders. This language helped to construct an effective interaction between stakeholders also provided a learning platform from each other.

The practice of this complex interaction provided a novel multilayered experience that encouraged stakeholders to think that gained information impact on different spaces at the same time with the help of the iterative perspective of design thinking. On the other hand, this process reflected on the perceptions of stakeholders positively. For instance, while entrepreneurs described themselves as open-minded characters at

the beginning of the collaboration, their perception on qualitative data and applied research methods were prejudiced. However, they became aware of the inspirational possibility of first hand information as well as continued to perform card sorting studies even after the collaboration was terminated. Besides, design researchers also were aware of and experienced that designing practice does not only link with an artifact or a system but also it is designing the research itself.

Pelin Efilti
Research Assistant and Master Student,
Istanbul Technical University,
pelinefilti@gmail.com

Özlem Gürtunca
Research Assistant Işık University

H. Hümanur Bağli
Associate professor Dr. Istanbul Technical University

Ozan Soyupak
PhD, İstanbul Technical University

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A Festival Identity as a Case Study of "Improv Design"

A Novel Technique for Creating Brand Identities

Saar Friedman

Abstract

OPEN is a full-service branding agency headquartered in Tel Aviv, serving commercial and artistic clients in Israel and worldwide, including El Al Airlines, Quaker Oats, Tuborg, Kaltura, and Mekudeshet. The latter is an arts and music festival aimed at changing the conflict-centric narrative surrounding Jerusalem by highlighting the positive aspects of the city's daily reality. In 2017, OPEN created an innovative and award-winning brand identity for Mekudeshet by transforming real data into a visual design. OPEN attached GPS trackers to eight Jerusalem residents and peace activists, and tracked their movements throughout the city. These movements were then plotted as individual paths on a single map of Jerusalem, each path uniquely designed to represent its respective participant. The final, abstract design showcased the beauty formed when these paths intersected and the borders between them dissolved. OPEN's final product has received several awards, has been featured in The Dieline and Brand New, and has earned OPEN an invitation to present at TYPO Berlin 2018.

Traditionally, real data informs branding concepts. OPEN took real data a step further: in the company's work for Mekudeshet, the collected movement data became the design itself. In doing this, OPEN introduced an uncontrolled variable into its concept, meaning that the company had limited control over the appearance of the final product, a technique that Saar Friedman, Chief Design Director and Co-Founder of OPEN, has coined "improv design." In a field whose established tools rely on planning, precision, and control, it may seem that improvisation has no place in design. Yet OPEN's successful implementation of "improv design" opens the door to more possibilities for using real data and improvisation to convey ideas and promote brands.

Theme: Conflicts
Keywords: improv design, cultural brands, data-driven design, dynamic identities, Jerusalem

1. Introduction

Established in 2000, OPEN is a full-service branding agency, consisting of a team of fifty multidisciplinary designers, strategists, and creative talent who build inspiring brands for market-leading companies and breakthrough start-ups, both in Israel and abroad.

In 2017, we were tasked with rebranding one of our long-time clients, Mekudeshet, an annual interfaith arts and music festival in Jerusalem. Our branding concept needed to reflect the festival's vision: portray Jerusalem in a more positive light. Our team created an innovative brand identity by attaching GPS trackers to eight Jerusalem residents, tracking their movements in the city, plotting the data on a map of Jerusalem, and using the resulting pattern as the blueprint for our design. In having our data become, rather than just inform, the design itself, we developed a new application for real data. By doing so, we incorporated an element of improvisation into our concept, a technique which Saar Friedman has coined "improv design."

In this paper, we examine our 2017 branding of Mekudeshet as a case study of "improv design." We begin with a Context section, in which we explore Mekudeshet as a client, and outline our criteria for branding the festival based on its characteristics and vision. Additionally, we review our company's past branding work for the festival, with whom we have partnered since its inception in 2012. In the Procedure and Methods section, we provide a step-by-step explanation of our process of creating for Mekudeshet: experimenting to see whether movement could be transformed into design (3.1), connecting our idea to Mekudeshet's vision (3.2), and executing our branding concept (3.3–3.5). In the Reception section, we relay the effectiveness of our final product. In the Discussion section, we analyze the contribution of "improv design" to data-driven design, as well as the place of improvisation in the creation of engaging, authentic, and effective brand identities. We conclude by considering how "improv design" opens the door to more possibilities for branding by means of real data and improvisation.

2. Context

Mekudeshet is an annual and influential music and arts festival in Jerusalem. Each year, tens of thousands of locals and tourists attend this month-long festival, whose extensive program includes lectures, tours of Jerusalem, and performances by leading musicians, artists and dancers, spanning across genres, cultures and languages.

Mekudeshet was founded with Jerusalem at its core. Jerusalem is a city of vast history, importance, and complexity, that engenders great emotion in its residents, visitors, and people worldwide. The city is home to a myriad of individuals and groups of all backgrounds, and is sacred to Judaism, Christianity, and Islam. As such, it suffers from much political and religious tension, both inter and intra faith. Mekudeshet, meaning 'sacred' in Hebrew, aims to shift the discourse surrounding Jerusalem away from conflict, and onto the beautiful aspects of the city and its diverse population:

> "[...Jerusalem is] our inspiration and our artwork...Its beauty mesmerizes us but its ugliness doesn't escape us...We try to replace fixed, pre-determined ideas with a less judgmental and multifaceted approach to the exact same reality. We try to elevate our gaze, to dissolve boundaries, to generate empathy, and to open our hearts and minds...[Jerusalem] enables us to unite around a common love for the city...[Mekudeshet] draws its inspiration from the daily reality in Jerusalem, the people who live here, and the fascinating processes that unfold in and around it" (Mekudeshet, 2017-a).

Our company has worked with Mekudeshet every year since the initiative's inception in 2012, then known as the Jerusalem Season of Culture (JSOC), branding advertisements, billboards, posters, videos, handbags, bottles, street art, and more. Thus, we are repeatedly tasked with exploring different lens through which to create effective designs that represent Mekudeshet. To remain faithful to Mekudeshet's essence, we took the time to truly understand the festival, and pinpointed two criteria that its branding must fulfil:

1. Speak to the fact that Mekudeshet is an arts and music festival, rather than a corporate brand. The design should be creative, unbounded by design norms, and even subversive.
2. Incorporate Jerusalem, and represent the positive aspects of the city's daily reality.

Our company has repeatedly succeeded at capturing the festival's essence, see designs from 2012 and 2014, in Figures 1 and 2, respectively. In 2012, Naomi Bloch Fortis, Executive Director of Mekudeshet, commented:





Figure 1. 2012 Mekudeshet poster. OPEN created this collage out of photographs taken in Jerusalem. In accordance with Mekudeshet's vision, this design shows that even when individual photos are taken from differing, unrelated locations in Jerusalem, they can still be connected to create a beautiful and inviting design.
Figure 2. 2014 Mekudeshet notebook cover. During a period of heightened tension in Jerusalem, OPEN created this image from ripped photographs, showing that beauty can be found and created evenin a time of conflict.

> "Despite the complex perception of Jerusalem, OPEN successfully turned us into a distinct and reputable brand, which positioned us as an important entity in the city. By converting sights of the city into a work of art, [OPEN's] design not only provided us with countless possibilities, but also allowed us and our audience to view the city in a different view, as a creative act, matching our vision and exceeding our expectations" (UnderConsideration, 2012).

In 2012, Paula Scher, the world renowned graphic designer and partner at Pentagram, see Figure 3, awarded OPEN's Mekudeshet design "Judge's Pick" in UnderConsideration's Brand New Awards competition. Scher commented that the design was "an unusually innovative and effective street campaign. What excited me about it was how the city of Jerusalem became part of the medium... the visual imagery is stunning, appropri-



Figure 3. Paula Scher awarded OPEN "Judge's Choice" in the 2012 Brand New Awards (Pentagram, n.d.).

ate, and surprising" (UnderConsideration, 2012).

In 2017, OPEN was once again tasked with rebranding Mekudeshet, and took its design in an even more innovative direction, which will be detailed in the Procedure and Methods section.

3. Procedure and Methods

3.1 Transforming Movement into Design

Like many artistic ideas, the inspiration for our Mekudeshet 2017 branding concept came unexpectedly. Shortly after commencing work on rebranding Mekudeshet for its 2017 festival, Saar Friedman, Chief Design Director and Co-Founder of OPEN, attended a dance show of the well-known Israeli Batsheva Dance Company. The show began with an empty stage. Then, one by one, each dancer stepped to his or her place, setting up the opening formation from which the company began the dance.

Saar was struck by how a choreographer had directed each dancer individually, while ensuring that the dancers' combined movements formed a stunning and cohesive group dance. He wondered whether movement could be mapped and transformed into a visual design. If movement could be made to form a visual pattern, such an unusual method would be perfect for branding a music and arts festival such as Mekudeshet.

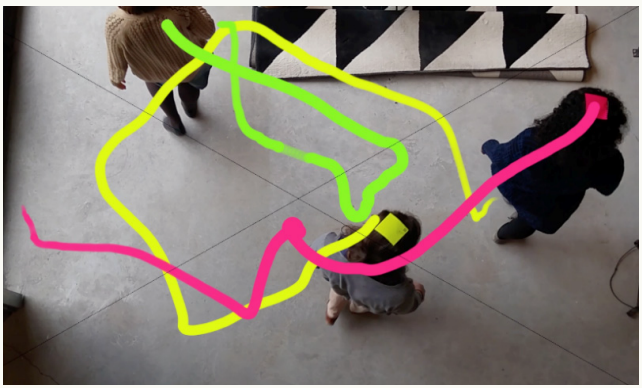




Figure 4. OPEN's first attempt at transforming movement into a visual design. Three OPEN designers walked around, filmed by iPhone. Then, using Adobe After Effects, OPEN manually mapped the movements. **Figure 5.** Completed sketch. After isolating the movement patterns from the original video of the designers, OPEN created a first sketch of the design concept for Mekudeshet's 2017 festival.

Back at OPEN's Tel Aviv office, we experimented. Three of our designers, donning neon-coloured Post-it notes on their heads, walked around as Saar filmed from above with an iPhone. Then, using Adobe After Effects, we manually mapped out the designers' movements, as shown in Figure 4. We then isolated the movement patterns from the original video and created the first sketch for Mekudeshet's 2017 branding, shown in Figure 5.

3.2 Connecting Mapped Movements to Mekudeshet's Vision

Our idea to visually capture movement spoke to the artistic aspect of Mekudeshet, but we still needed to connect our concept to Mekudeshet's vision of showcasing Jerusalem in a positive light:

- How would visually mapping movement represent Mekudeshet?
- What would the mapped lines represent?
- How could each line represent something different?
- How would the crossing of these lines represent Mekudeshet?

We brainstormed a wide variety of ideas, from tracking vehicular movement in Jerusalem, to mapping Jerusalem neighborhoods and where they intertwine, to displaying different elevations in the city. Finally, we found our answer in one of Mekudeshet's events, "5 Ways to Dissolve Boundaries," which showcases Jerusalem residents who work to unite Jerusalem's diverse population by breaking boundaries and stereotypes in their daily lives. Tour participants meet several of these "boundary dissolvers" and learn about their work and activities. From Mekudeshet's website:

> "[5 Ways to Dissolve Boundaries] provide[s] us with an opportunity to rid ourselves of everything we thought we knew about Jerusalem and rethink the city. To get to know people we didn't know existed, discover places that are far from the eye and hidden from the heart, and to come face-to-face with the reality of Jerusalem – as crafted by the people who insist on influencing it every day, every moment…You will meet [the boundary dissolvers]…and hear how each of them according to their world view turns Jerusalem into a better place…" (Mekudeshet, 2017-b).

Inspired by this event, we came up with a concrete plan that linked our unconventional concept to Mekudeshet's vision:

1. Using GPS, track the movements of eight diverse Jerusalem residents.
2. Chart the participants' tracked movements on a map of Jerusalem.
3. Showcase each participant individually by designing each movement path differently based on its respective participant's background and work.
4. With the movement data collected and individual path designs prepared, paint each route with its uniquely designed texture, blending designs where the paths intersect.

In steps 1–3, we would relay the diversity of the city's population. In step 4, by showing how the individual paths intertwine to create a beautiful and cohesive design, we would highlight a positive aspect of Jerusalem, formed by its diverse population coexisting. These steps are detailed in subsections 3.3–3.5.

3.3 Distinguishing each Participant's Movements

We chose to track culturally and religiously diverse Jerusalem residents who are also peace activists. In addition to representing Jerusalem's diverse population given their differing backgrounds, we felt that these individuals both embodied and fulfilled Mekudeshet's vision. These "boundary dissolvers" focus on bringing together people of all backgrounds, and both uncover and create the positivity that Jerusalem has to offer, and which Mekudeshet aims to highlight.

We wanted to make sure that when we translated each participant's tracked movements into our final design that we highlighted these "dissolvers" as individuals in a fresh and interesting way. To do this, we chose an image for each participant based on his or her background and work. Then, we used each photo as inspiration from which to manually design a unique textured brush for each participant's tracked movements, creating a total of eight brushes, using the Brush Tool in Photoshop, see Figures 6–8.



Figure 6. Nadim Sheiban is the General Director of the Museum for Islamic Art, and the first Muslim to direct a museum in Israel. Between 2004–2014 he developed and ran a variety of projects in community, culture, and education while working at The Jerusalem Foundation, which aims to "shape a modern, unified and vibrant city by creating opportunities for all Jerusalem residents" (The Jerusalem Foundation, n.d.). The image chosen to represent him is an Islamic work of art, and was used as inspiration for the creation of his textured brush.

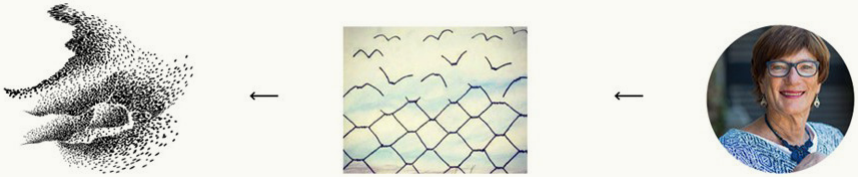


Figure 7. Born male to an ultra-Orthodox Haredi family, Yiscah Smith married at 20 and moved from the United States to Israel. 20 years and six children later, Yiscah became secular, left her family, returned to the States and began her transition to female. After her transition, Yiscah felt more authentic to herself, and consequently reconnected with her Judaism. Smith is a spiritual guide, writer, and educator. The image chosen to represent Yiscah reflects her breaking free, and was used as inspiration for the creation of her textured brush.

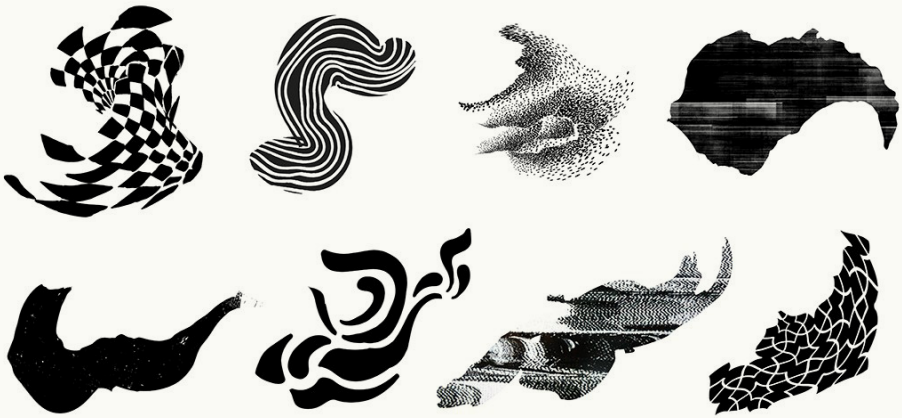


Figure 8. OPEN's completed textured brushes, each representing one of the eight tracked participants.



Figure 9. Map of five of the participants' GPS-tracked movements in Jerusalem

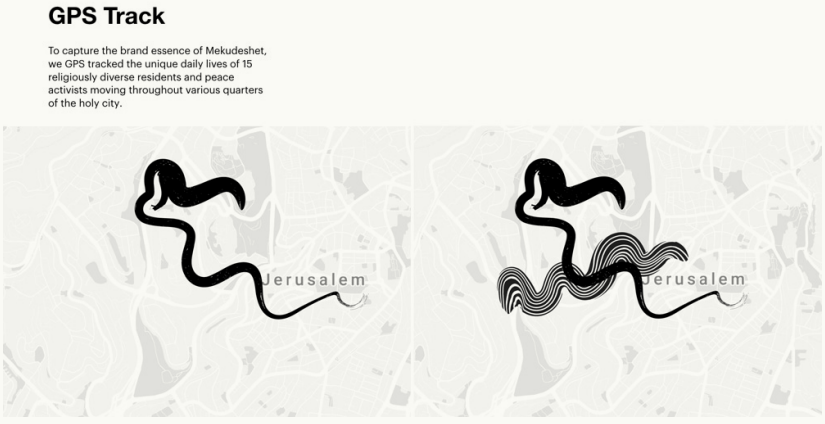


Figure 10. The process of painting each participant's tracked movements with their respective, uniquely designed textured brushes.

3.4 Collecting Movement Data

We attached GPS trackers to each of the eight participants and tracked them over the course of a day in Jerusalem. We then converted this real data into a visual map displaying the participants' routes and where they crossed, as shown in Figure 9.

3.5 Putting Together the Final Design

With our movement data and individual participant brushes ready, we set to work on putting together the final design. This process was a great



Figure 11. The final design for Mekudeshet, showcasing the individual participants, as well as the coming together of the eight paths.



Figure 12. Mekudeshet 2017 bus stop advertisement.

technological challenge, requiring a vast amount of trial and error, using After Effects, Photoshop, Illustrator, and even our bare hands. We had mapped each participant on a different grid, which gave us a variety of changing daily and hourly images to choose from. Furthermore, we played with different permutations of running the textured brushes on each participant's respective route, as well as of blending the participants' paths where they crossed, as shown in Figure 10. Finally, we arrived at the final product, a meaningful and freeform design that captured the essence of Mekudseshet, see Figures 11–12.

4. Reception

The unconventionality, depth, and overall look of our design made our work especially effective, garnering much attention from media and visitors alike, which in turn generated more interest in Mekudeshet's already-influential festival. Our branding for Mekudeshet has been widely recognized, winning awards in several competitions, including:

- Gold Medal in the 47th Annual International Creativity Awards, Category (Print, Branding Campaign)
- Silver Medal in the 13th Annual Davey Awards, Category (Corporate Identity, Design/Print)
- Silver Medal in the Lisbon International Advertising Festival, Category (Creative Innovation).

Our branding was recognized by two major branding blogs: The Dieline and Brand New (Johnson, T.C., 2017; Mouradian N., 2017; Armin, 2017). The latter wrote: "The concept is quite interesting and the execution is pretty wild... It's both provocative and visually stimulating... Overall, and [even] without the explanation, the identity feels festive and demands attention, which is what you want for a festival" (Armin, 2017). The Association of Registered Graphic Designers (RGD) chose OPEN to give a webinar to 1000 participants. Finally, our branding earned us an invitation to present our work at TYPO Berlin 2018.

5. Discussion

The use of real data in branding adds a dimension to the branding process. This tool brings research into the art, to justify, inspire, and prove branding concepts. Thus, the resulting products are not just beautiful: they are more authentic, meaningful, and effective. In our Mekudeshet branding, we took real data a step further: our movement data did not just inform the design, it became the design itself. Our innovative use of real data contributed to our branding identity's success: our final product both reflected, proved, and fulfilled Mekudeshet's vision:

- Our technique of creating our design from movement data allowed us to quite literally reflect Mekudeshet's aim of showcasing the positive daily reality of Jerusalem, which added an element of truthfulness to our concept.

- By tracking eight culturally and religiously diverse Jerusalem residents, and blending their paths together into a beautiful design, we relayed that the dissolving of borders creates something positive: Mekudeshet's vision is desirable. Furthermore, in our choice to track "border dissolvers," Jerusalem residents who share Mekudeshet's vision and already fulfil it in their daily lives, we relayed that Mekudeshet's vision is also possible.
- Lastly, our branding acted as an invitation to fulfil Mekudeshet's vision. Our design was the first piece of artwork in the festival, so to speak, appearing in advertisements, on the festival program, on festival merchandise, and more. The design invited its viewers to join Mekudeshet, to witness the reality which the festival showcases, and be a part of the change it envisions: "All of our creativity, in the realm of art and culture and in any others, derives from our desire and obligation to create art that emerges from reality and influences it in return" (Mekudeshet, 2017-a).

By creating a design from real data, we introduced an uncontrolled variable into our design concept. We had no way of knowing where our tracked "boundary dissolvers" would go, and, as such, had limited control over the appearance of our final product. In doing so, we created an entirely new consideration: adding the unknown as a crucial element of the branding process, a technique Saar Friedman has coined "improv design." In a field whose established tools rely on planning, precision, and control, these words seem to contradict. After all, how can design be improvised? How can improvisation be designed? As we have learned from our Mekudeshet branding, improvisation, and exercising less control, is an interesting, viable, and effective new tool for branding as a field. Naturally, this technique won't work for all clients: designing for artistic and commercial client will differ. Most commercial clients require more conservative, controlled techniques; but designing for a creative client such as Mekudeshet may allow for more flexibility in the branding process. Just as Mekudeshet aims to show how seemingly conflicting sides can create something beautiful when brought together, so too does "improv design" join two seemingly opposing terms.

6. Conclusion

We rebranded Mekudeshet by tracking the movements of "boundary dissolving" Jerusalem residents, plotting and designing their individual movements on a map of Jerusalem, and creating a final, freeform design which showcased the beauty formed when the participants' routes intertwined. In this process, we developed a new application for real data, and, in doing so, we created an entirely new technique: "improv design." As an agency, we pride ourselves on our ability to produce both traditional and unconventional branding identities. We aim to foster a work environment which emphasizes and is conducive to experimentation and out-of-the-box thinking. Our very name – OPEN – reflects this philosophy. In that vein, and following our successful implementation of "improv design," we believe that incorporating novel data techniques and improvisation with traditional industry norms can yield exceptional designs and propel branding as an industry into the future.

Saar Friedman
Chief Creative Officer, OPEN
Saar@open.co.il

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OBJECT AMERICA

Observational Practices and the Everyday

Pascal Glissmann, Selena Kimball

Abstract

The Observational Practices Lab, Parsons School of Design, aims to provoke dialogue and instigate critical reflection about the very nature of observation across disciplinary boundaries. Observation is fundamental to ways of knowing, yet it is rarely investigated as a set of comparative methods and contingent practices. Initiated by questions arising out of art and design practice, the lab is driven by transdisciplinary and collaborative learning through experimental approaches to research. We aim to foster a non-hierarchical engagement with diverse modes of observation in order to investigate it's past effects, present consequences and potential in creating the future.

As a response to recent changes in the US political landscape, the Observational Practices Lab, initiated the transdisciplinary research project OBJECT AMERICA to explore the idea of "America" through everyday objects. We invited Ellen Lupton, Senior Curator at Cooper Hewitt, to choose an object which she believed would represent "America" into the future. Thirteen researchers from very different disciplinary backgrounds, from climate science to poetry, investigated this object. The observational methods that emerged will be disseminated publicly to not only inspire new ways of seeing but also contribute to the vital conversation about who and what defines "America".

This paper describes the background and rationale for the project; introduces its participants and mechanics; and offers insights into future visions and applications.

Theme: Conflicts
Keywords: observation, critical practice, material culture, collaborative learning, transdisciplinarity, the everyday, politics, mass observation, Alexander Von Humboldt

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1. Introduction: Observation & Transdisciplinary Investigation

What exactly does it mean to "observe"? Neither neutral nor passive, the act of observation has real consequences for our everyday lives. How do observational practices shape the thing under investigation; how might the very act of structured attention change the perceiver(s) and by extension create new communities? To what extent do observational practices from across disciplines actually define what we know about the world? How might these practices help create national identities, and affect our day-to-day experience?

1.1 The Observational Practices Lab

The Observational Practices Lab aims to provoke dialogue and instigate critical reflection about the very nature of observation across disciplinary boundaries. Observation is fundamental to ways of knowing, yet it is rarely investigated as a set of comparative methods and contingent practices. Initiated by questions arising out of art and design practice, the lab is driven by transdisciplinary and collaborative learning through experimental approaches to research. We aim to foster a non-hierarchical engagement with diverse modes of observation in order to investigate its past effects, present consequences and potential in creating the future. As Lorraine Daston and Elizabeth Lunbeck point out in their seminal book "The History of Scientific Observation," the process of observation is not specific to any discipline, social class, professional community, or situation:

> "Throughout its long history, observation has always been a form of knowledge that straddled the boundary between art and science, high and low sciences, elite and popular practices. As a practice, observation is an engine of discovery and a bulwark of evidence... It is pursued in solitude but also in the company of thousands." (Daston & Lunbeck, 2011, p. 7)

The lab's aim is not to define the term *observation*. Instead, we are interested in cultivating an open dialogue across diverse practices about the imbedded concepts, disciplinary processes, and methodological challenges inherent in conducting observation(s).

1.2 Seeing Across Disciplines: Mass Observation and Alexander Von Humboldt

The Observational Practices Lab is focused on the questions of how observational practices work, what different disciplines might learn from another's approaches to observation – which methods are best suited to which subjects and why, and how observation itself can create communities and initiate a new view of our everyday reality. We believe that the understanding of the complexities everyday life can only be deepened through cross-disciplinary insights that transcend the boundaries of expertise. The formation of the lab was partly inspired by two historical precedents that reached across disciplines: the archives of everyday life created by the transdisciplinary British Mass Observation Movement; and the extensive observations of the American continent conducted by the German polymath Alexander von Humboldt.

Initiated by an artist, an anthropologist and a journalist-poet in 1937, the Mass Observation movement grew out of a sense that the experience of the "mass" of people was not being reflected in the media; it sought to create a new representation through an "anthropology of ourselves", an archive of extensive observations of everyday life by citizen observers. This sense of being fed up, misrepresented, and confused about the country as it was reflected in media, resonates with the heated debates in the US today – including the precipitous influence of "fake news" and the outcry around whose "America" is really being represented. The Mass Observation movement sought to embolden people to take seriously their own immediate observations of their everyday lives, and the value that might have for others. Made publicly available in its first decade through books and publications, today the Mass Observation archive is a rich trove of primary documents, diverse perspectives on life in Britain between 1937–1949. The movement was revived in 1981 and continues today to archive observations of the everyday. (Hinton, 2013; Hubble, 2005)

The Observational Practices Lab is situated in New York City, in the contemporary political landscape of the US, where the administration is promoting a tightening of limits and borders – the "America First" agenda. It is humbling (and useful), therefore, to ponder a larger "America" in the historical context of observations conducted by an influential early explorer seeing the continent for the first time. Alexander von Humboldt first came to the "New Continent" (specifically South America) in 1799; thinking beyond disciplinary boundaries to gain holistic understanding

was one of his key concerns. As an explorer, naturalist, and geographer, he was driven by the idea of using his observations to unify diverse branches of scientific knowledge and culture. Consequently, his body of published work is a hybrid that combined rigorous data-driven scientific reasoning with essays that were meant for the general public: "It was through his non-specialized writings rather than his scientific treatises that Humboldt sought, and won, his broadcast impact on the public imaginations of Europe and Euroamerica" (Pratt, 2010, p. 423). His transdisciplinary observation-based approach shaped an alternative understanding of the scientific process which influenced generations of scientists and artists. Susan Faye Cannon defined this philosophy in her book "Science in Culture", and in doing so pointed to the necessity to observe both the vastness and the humbleness of the everyday:

> "Thus the complete Humboldtian traveller, in order to make satisfactory observations, should be able to cope with everything from the revolution of the satellites of Jupiter to the carelessness of clumsy donkeys." (Cannon, 1978, p. 76)

1.3 Observing Everyday Objects: OBJECT AMERICA

This particular project, OBJECT AMERICA, was born out of discussions about how to utilize the Observational Practices Lab after the election. What kind of investigation could serve as counterpoint to this increasingly polarized environment? A narrowing of vision certainly plays a role in our current political situation, with a president that doubles down when the facts contradict him. (Which they often do.) This tendency to perceive the world through a particular lens is of course not limited to political parties, nor is it new – certainly we are conditioned culturally and socially to "see" in certain ways. But in the face of an administration trying to "Make America Great Again" we have to ask, what is this "America"?

We focused on one everyday "American" object to ground this investigation. Our intention is to shake the way we habitually perceive an object, which is culturally and socially conditioned. Donald Norman describes this as "Mental Models":

> "Mental Models, our conceptual models of the way objects work, events take place, or people behave, result from our tendency to form explanations of things... We base our models on whatever

> knowledge we have, real or imaginary, naive or sophisticated." (Norman, 1990, p 38)

Indeed, we may need these "Mental Models" to organize our everyday – If we don't pay attention, our daily rhythm is dominated by digitally connected calendars and social platforms that swamp us with detailed information about our friend's lives. The tools we created to serve us, to improve our communication and to better our lives, instead create an environment of putative ongoing urgency. It is not surprising, therefore, that we tend to accept "the news", "the truth" and also "the object" the way our society – or a group of alleged opinion leaders with good or ill intentions – wants us to see it.

To really *see* an object, argues Ben Highmore (2011) in his book "Ordinary lives: Studies in the everyday", we need not only to take the time to notice it, but also realize that objects extend far beyond us humans. They are not simply their use value, the conceptual categories we fit them into, or feelings and memories we project on to them. We need to train our senses to listen to something beyond ourselves, namely, "the thingly world":

> "I start out by noticing a chair that most of the time (and especially when I am sitting in it) I fail to notice. The thingly world, I argue, is neither most usefully explained through the optic of cultural symbolism (what the chair stands for, what cultural values it embodies) nor through the sense that an 'owner' makes objects significant by investing them (and infesting them) with their own meanings ... Symbolism and investment will be part of the story but I hope too that my chair, from its own thingly perspective, will get something of a look in". (Highmore, 2011, p. 59)

The "object" of research for OBJECT AMERICA, we decided, should be something relatable, something that could be found in everyday American life, a physical *thing* that a majority of Americans would have had contact with. We were also interested in working with "official" collections and collaborating with curators whose work contributes to a kind of collective archive, preserving the everyday artifacts of history so they may give context, and speak to the present.

We invited Ellen Lupton, Senior Curator of Contemporary Design at Cooper Hewitt, Smithsonian Design Museum in New York to join the project and choose an object for this investigation which she believed

would represent “America” into the future from the museum’s collection. She chose the model 500 Telephone, 1953 (introduced in 1949), designed by Henry Dreyfuss, Henry Dreyfuss & Associates (USA) for Bell Laboratories. After its introduction, this phone became widely used, arguably the standard, in American households.

On September 7th, 2017 we met with all the researchers at the Cooper-Hewitt, where Ellen introduced us to the model 500. We had bought thirteen phones on ebay so that each researcher would have their own physical object to work with as primary source material.

> “You might notice when you play with these phones that they are quite beat up. It is because these were not loved. These were not considered beloved consumer products. They were actually owned by the telephone company. And when you rented telephone service the phone was simply part of it. People didn’t have a relationship – they weren’t choosing phones as something intimate. We have a different relationship with our phones today” (Lupton, 2017)

These model 500’s were witness to the everyday private lives of homes across America, traces made visible by the scratches and marks; written phone numbers and scrawled-upon stickers. We watched as researchers chose their phone – testing the bells, unscrewing the earpieces – finally choosing one to take with them (although as bystanders we often did not know what compelled these choices). In a series of three panels, these researchers came back together and spoke to the public and our graduate students to present their findings.

> “...observation is a highly contrived and disciplined form of experience that requires training of the body and mind, material props, techniques of description and visualization, networks of communication and transmission, canons of evidence, and specialized forms of reasoning.” (Daston & Lunbeck, 2011, p. 3)

2. OBJECT AMERICA Archive: Phase 1 Reflections

2.1 Observation through the Senses

> If, as some scientists have claimed, there are no fewer than seventeen ways in which animals actually sense the world, have some beyond the canonical five been attributed to humans as well? When have putative sixth senses such as balance, desire, or even speech been added to the mix? (Jay, 2011, p. 310)

The phone was heavy but the cultural geographer Cindi Katz was hauling it around the streets of Manhattan, speaking into the black receiver that was perched on her shoulder, cords dangling, the bowling-ball sized phone clutched in her hand. "I situate whatever my object of inquiry is. In this case (I situate) the telephone into a historical, cultural, political, economic, and spatial context". (Katz, 2017). In other words, Katz brought it for a walk in the world like we would with our phones today. But the model 500 is a visible anachronism, and obviously not built to be carried long distances. Katz continues, "...it's the exact phone of my childhood which sat on my mother's night table and the wires are short – you can't get far. I would sit on my parent's bed to talk or be crouched on the floor between the bed and the night table in a little corner. And I thought about (this phone's) relationship to *her* body, *my* body – and *any*body and the household, the way you had to sit near the phone to talk. So you're tethered – something unusual for anybody born after 1990." (Katz, 2017) Being tethered, paradoxically, makes one keenly aware of one's body and the physical and emotional space it occupies and shares with others. And each member of a household in the US for decades grasped the same receiver, shared the same phone.

Katz's method of bringing the model 500 phone out onto the busy public streets heightened, by contrast, the recollection of private space. Anuja Bagul, Senior Material scientist at Material Connexion, associated the phone instead with public power and weighty decision-making. As evidence, she showed a photograph of her grandfather in Mumbai,[1] phone in hand, and President Obama speaking into a black chunky receiver (the

1 While the model 500 phone was chosen as an object representative of America, two of our researchers, Anuja Bagul and Sumita Chakravarty who are both Indian and now currently live in the US, each had strong cultural memories of this telephone that were imbedded deeply in their country of origin.

Western Electric 500 was used most recently by president Johnson in the 1950's, although Obama had a handset that looked similar). Simply by picking up the receiver, she said, I straighten up, I pushed my shoulders back. "It's the materiality of the phone, the sturdiness that brings about the spontaneous reaction your body… It's the heaviness. It's the fact that… this particular phone was made from Bakelite which is an industrial polymer." The industry now focuses on phones that are lightweight and easily transported, and completely permeate our public and private lives. Bagul reminds us, "the materials we (material scientists) are using for the surface are glass and metal: Glass and metal are what you're touching the most in the world – did you know that?" (Bagul, 2017)

The very ubiquity of that act – touching our cellphones – means that few of us are actively reflecting with precision on what this *feels* like, on the material properties of glass and metal. The composer and musician Roarke Menzies counters this trend precisely by heightening physical contact with technological objects, making the audience aware of the phenomenological experience – the feel of the devices and the soundwaves they emit. "I like to have physical objects in front of me. Lots of little knobs and faders because I'm interested in having an immediate tactile relationship with the sounds being made. I'm interested in the gestural aspects…in the manual hands and digital fingers – interactions with the devices". As observational research, he staged what he called "a direct encounter with the phone itself". There, in a large conference room, with no amplification, Menzies started to "play" the phone. The focus shifted palpably, as the audience leaned in, participating in a reciprocal act Menzies calls the practice of listening. "The point is to be receptive…Once I stop talking you'll notice certain aspects… we're deep in the belly of the built environment – the AC is in fact quite loud once you take away a foreground – and you'll also notice maybe that your internal life is pretty noisy as well. So we can both treat those as counterpoints…" (Menzies, 2017)

Although their methodologies differed, Cindi Katz, Anuja Bagul and Roarke Menzies, all focused on the relationship of the body to the object of investigation. They were each rigorously attentive to physical presence, and sensory response. In his book the *Principles of Psychology*, William James writes, "millions of items in the outward order are present to my senses which never properly enter into my experience. My experience is what I agree to attend to… Only those items which I notice shape my mind." (James, 1890, p. 409). To shape the mind, according to these researchers, we might start with observations of the sensate body.

2.2 Observation through Specialized Instruments

> "...there are those things that...having looked at in vain I never dared see...there are also those things that I see differently from other people, and those things that I begin to see and that *are not visible*. And that is not all..." (Breton, 1928)

How might we even begin to observe those things *not* available to the senses? Humans, according to climate scientist Marco Tedesco, can see only about 0.000000001 percent of the electromagnetic spectrum. This leaves a staggering amount of information in the world that humans cannot directly perceive. Tedesco posed a question that at first seemed obvious: "Is this model 500 phone black?" The model 500's are all alike – they were not customizable. They were rented, they were returned to the phone company when you moved out, and they all looked exactly the same: black. But Tedesco wanted the audience to question their assumptions about vision. He has been researching the cryosphere, that slowly disappearing state of matter, and has studied tiny dark particulates in ice and snow. Though not visible to the eye, these particulates absorb light at a much faster rate than snow crystals, and therefore accelerate the rate of melting in, for example, the arctic where he conducts research. Tedesco worked with his assistant and used the spectrometer normally used for climate testing, to test the phone. With it, Tedesco says, "we can actually calculate how light is reflected by the objects at different wavelengths in different color. Even where we don't see them". So is the model 500 phone indeed "black", according to Tedesco's observation? Yes it is. But the black hat his assistant was wearing was not, in fact, black. This has social and political implications, Tedesco thinks.

> "I just became a U.S. citizen, so I feel more comfortable speaking about these things...The color of skin that we see in our visible wavelengths is completely different from what our skin will look like if we see it in different wavelengths – my (light-colored) skin in infrared is much darker than the skin of my Indian or African-American colleagues and students...what we see is not just what's there. And we should never really trust what we think completely". (Tedesco, 2017)

So, how do we percieve what we cannot actually directly see? What other specialized tools could be used? For the poet LB Thompson, the specialized tool is poetry and the invisible place is the American prison system. Thompson knew the phone would have particular resonance for prisoners; telephones remain one of their primary means of communication with the outside world. Thompson writes, “While those of us living outside of prison in 2017 find ourselves almost constantly in touch with the people in our lives, and the ubiquity of phones with cameras and recording capabilities is a fact shaping our behaviors, prisoners are notably disconnected.” Thompson contacted the PEN writers organization and got in touch with their prison mentorship program. She wrote letters to participants in the program, inviting them to be a part of OBJECT AMERICA by calling the model 500 phone LB had set up in her office and reading their poem to her. This poem by Matthew Feeny, is a glimpse into what the specialized instrument of poetry can help us hear, see and experience:

The telephone is an inmate’s lifeline
To Reach out & Touch our Friends & Family.
Waiting in line 45 minutes for a 15 minute call
“Can you hear me now?!?”
The high & low tide of emotions
Ebbing and flowing with the cacophony of calling inmates

The autobot voice telling us “your call was not accepted – please try again later” triggers
schemas of rejection.
WHATTHE HELL?!?
Call back again
Double Stuff that rejection.
Maybe they’re busy? Remember when you once had a life?

The telephone is an inmate’s lifeline
That we hold on to for dear life.
Refusing to let it go
Even while it’s shocking us like a Taser.

Feeny’s poetry, these observations from inside the US prison system, convey an emotionally candid description of what it is like to attempt a call to the outside world from “inside”. Waiting and waiting in line for the use

of that single telephone. Who does and does not have access to systems of communication and what does this say about American society?

"How do people allocate limited resources – money, time, years of life – in a world of unlimited wants?" asked Lisa George, applied economist, introducing her field, "...and what do (these choices) mean for society as a whole?" Using data and statistical tools, George addressed the impact the telephone has had on the fabric of social life in America: does the telephone increase or decrease face-to-face interactions over time? "How can we distill down what are the incentives to change behavior that came about with this object, the telephone, and then what were the social consequences of that change?" George analyzed the existing data and models – vivid illustrations of, for example, how and when telephone service spread in the country. Intuitively, it would seem that telephones would reduce face to face contact between Americans, promoting only "weak ties". "It turns out that this kind of technology that bridges distance in some ways also brings us closer."

> Attention, observation itself, brings things (and people) closer, snaps them into focus. Using devices – statistics, spectrometers, even poetry – can increase our proximity, uncover that which was hidden. These specialized instruments are the "myriad of...ingenious inventions designed to make the invisible visible, the evanescent permanent, the abstract concrete." (Daston & Lunbeck, 2011, p. 1)

2.2 Observation through Speculation

> "I am a firm believer, that without speculation there is no good and original observation." (Darwin, Charles. Letter to A. R. Wallace, 22 December 1857)

To take the concrete and abstract it, meanwhile, may paradoxically provide us with very tangible insights. Michael J. Barany, historian of science, speculates about the telephone in part through a process of inventorying. "There are many ways to go about inventorying. You can sort. You can interact with objects. You can classify them. You can track different particular types of objects or different features of those objects." With the model 500, Barany inventoried, for example, the various numbers printed on it, it's interactional competencies and also it's points of inter-

connectivity. Speculating about how a single phone might connect to a national network of communication, Barany asks, "How do the three color-coded wires of the individual phone connect to invisible exchanges, to networks of networks, producing a sensation of aural proximity." (Barany, 2017). If we can't see it, we might not think about its existence at all. But, inventorying can help bring the unseen into view. Barany continues, "the general principle of inventorying is taking what you encounter and making of it an object by deriving certain kinds of salience". (Barany, 2017). In this case, the new "object" is the points of interconnection themselves, and their relationship to one another, which could not be seen before. "The visualization of the unseen – also called Black Boxing – comes from circuit diagrams, where certain details are omitted and one is concerned *only* with inputs and outputs from an otherwise closed system." Speculating about the hidden mechanisms and interactions of an inanimate object through abstracting and inventorying redefines the very object of inquiry.

We have all been in a doctor's office answering questions aimed to get at what can't be directly seen – for example, our past medical history and physical conditions. It is easy. We know our past; we know how we feel. Answering for somebody else is harder: What do we know about a close family member? We project, we interpret, we neglect and we speculate because we are upset, we don't have the information, or we are tired after years of caretaking and might have prejudiced opinions. Taking this one step further: What happens if we answer these questions for an object? Dr. Fernando Kawaii did exactly this with the model 500 phone. What seems absurd in the beginning becomes thought provoking – specifically when Dr. Kawai's applies something called "Meaning Centered Therapy", a life review for seriously ill patients. "It involves answering specific questions aimed at raising awareness and inspiring the patient to reflect as the end of life approaches". (Kawai, 2017). Developed by Austrian Neurologist and Psychiatrist Viktor E. Frankl (Man's Search for Meaning), questions include: "What accomplishments are you most proud of? What would you like to be remembered for? What gave meaning to your life? Would you like to give any advice to your family?". (Kawai, 2017). How would it situate itself among its own kind and what is left to say? As Dr. Kawai suggests for the model 500: "Family descendants include the Pay-Phone, the Land Line touch phone, the Mobile Phone 1st Generation and the mobile smartphones. (Kawai, 2017). What knowledge would the model 500, that has been sitting on the same table serving (and observing)

a whole generation, share with an iPhone X that is not only traveling the world but also has a life expectancy of just a few years? Again, and equally to Barany's approach, these speculations won't hold facts that help any kind of reasoning. But they challenge our mental models, and, in that sense, help create ideas and shape fresh views on the object.

The artist Benjamin Rubin pointed out a different kind of speculation, one that the object is imposing on us. Rubin's observation is largely based on the sounds of the model 500, how these had an impact on his life and how they changed over time: "My feelings about the sound of a ringing phone have really changed since I was a kid – when I was a child that sound usually meant that a friend, neighbor, or relative was calling and the sound really had entirely positive connotations for me". (Rubin, 2017). He continues: "But (now) when my cell phone rings, beeps or buzzes – whether it's a text or call – I now feel this mix of dread, fear and annoyance". (Rubin, 2017). In both cases, Rubin describes assumptions – or speculations – of what he is expecting to happen in the very next moment. In contrast to Barany and Kawai, this speculation is not about the object, its future, or how it might impact our society all together. It is a micro-speculation of a personal encounter facilitated by "the object" that is part of our everyday. Phones have the power to trigger emotional responses that are completely arbitrary to the signal itself but evoked by projected scenarios based on experience, mood, hopes and fears.

Barany, Kawai, and Rubin's speculations about the model 500, by acknowledging what it triggers in us, takes the observer beyond the factual world and opens access to emotional engagements, while impacting real-world issues such as industrial policies, public health regulations and fair access to technology. Objects, like images, "draw us into the contested field of the unspoken political where looking remains intense and contentious on the one hand and speculative and creative on the other. Images invite us into a moment of speculative engagement without relinquishing affective intensity and political investment". (Hattam, 2014, p. 141)

3. Conclusion

The nature of observation has changed in its entirety since, for example, Alexander von Humboldt traveled on foot with his ponderous bag of instruments observing and carefully documenting "America", then disseminating what he encountered in carefully illustrated publications. Replaced, perhaps partly, by ubiquitous digital networks that connect

archives of crowdsourced insights with mobile screens of global users. However, we argue that observation itself is a discourse in its own right, where different disciplines may benefit from their mutually independent histories of observation, and current application. Thoughtful transparency about methodology, reflection, curation and accessibility will remain crucial – even more so in a world that delegates increasing power to Big Data, Machine Learning and Artificial Intelligence. Listening to our guest-researchers and their diverse ways of seeing a single object, we believe all the more that educating and training these digital automated systems needs to be inclusive of individual and transdisciplinary voices including the unexpected and the absurd.

What role will observation play in the future? How will it expose, elucidate – or speak back to – systems of power and politics? The Observational Practices Lab is planning three more phases of OBJECT AMERICA in 18/19, 19/20 and 20/21. Our aim is to make visible the unseen, and speculate about the future of America, through three new "American" objects housed in different types of US collections. During this era of the Trump administration, we seek to create a platform for open exchange, exploring other ways of seeing, in an environment of playful curiosity, intelligence, and mutual respect.[2]

Pascal Glissmann
Assistant professor of Communication Design
Co-Director Observational Practices Lab,
School of Art, Media, and Technology Parsons School of Design, USA
glissmap@newschool.edu

Selena Kimball
Assistant professor of Contemporary Art Practices
Co-Director Observational Practices Lab,
School of Art, Media, and Technology Parsons School of Design, USA
kimballs@newschool.edu

2 Looking at the process of phase 1, the loose clustering of transdisciplinary methodologies into the categories of Senses, Specialized Instruments and Speculation has offered a helpful framework for a comparative analysis. We do, however, acknowledge that most processes require a combination of all three domains and are not discrete by nature. (We'd like to think of them as shifting and temporary baskets that transport ideas and spark conversations.)

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Decolonisation in Tertiary Design Education

Redesigning the Content, Structure and Space of Design Disciplines for an Inclusive Pedagogy

Denver Hendricks

Abstract

The Department of Architecture (DOA) at the University of Johannesburg (UJ) is actively developing a decolonised curriculum. Given the evolution of demographics at our university, black learners are the majority and it is time to engage actively with a colonised curriculum. This paper considers decolonisation as a crucial contribution towards curriculum transformation in the areas of structure the department, the content which it produces and production of space and hierarchy. These factors in our department requires both bold and uncompromising steps towards an inclusive and new pedagogy. The methodology of this research is to understand how colonialism affects our design curriculum, to articulate the issues, to develop a new value set in order to drive a practical way forward for curriculum re-shaping.

As a new head at the DOA at UJ. I reflect in this paper on interventions we implemented as experimentations to begin to articulate a vision for a transformed department in the design field. A vision which addresses how we relate to our own work and learners. I will unpack distinctions of curriculum content development, taking a critical view of how it is affected by colonialisation. The methodology I propose for this paper is a series of literature reviews on design studio pedagogies and decolonisation, documenting our experimentations and general feedback from students through informal interviews.

The intention of this paper is to argue that decolonisation is not a quick fix and that the role of experimentation is significant. Buy-in from peers and learners are important. The effects thereof are not limited to the actual learning content only but can contribute significantly to a larger cultural transformation of a school of design.

Theme: Conflicts
Keywords: higher education, diversity, inclusive pedagogy, learning communities, reflective practitioner, culturally responsive pedagogy, equity

1. Introduction

The recent decolonization debate has put pressure on academics to engage with the long term ‘narrowly focused’ (David, 2011,p.431) the author draws together the diverse approaches to equity and widening participation found in the innovative international research conducted in Ghana and Tanzania by contrast with those in the \”global North\”, using the United Kingdom as a case study. In particular, the author considers the utility of equity scorecards around the theme of the three Rs--\”recruitment, retention\” and \”results\”--in the context of very diverse national and international cultures and contexts. The focus of these scorecards is on equity in terms of gender, age and socio-economic backgrounds. Using research evidence from the United Kingdom’s Teaching and Learning Research Programme on fair access and widening participation in higher education, the author also draws out further conceptual considerations about equity and diversity as key to developing policies, practices and pedagogies for the future of global universities in the twenty-first century. What are the obstacles and opportunities for envisioning equitable and fair policies, practices and pedagogies for the three Rs to enable and enhance higher education for women and other socio-economically disadvantaged groups? (Contains 1 note. curriculum. It has subsequently left lecturers, program leaders and Heads of Departments without a roadmap to any kind of pedagogical decolonised utopia. Through normative scholarly articles based on the intersection of education and colonialism, this article discusses concepts of curriculum planning, diversity and inclusivity in higher education. These principals were then applied and tested in our design studios at the Department of Architecture at the University of Johannesburg. These interventions are intended to disrupt the traditional pedagogy in the form of departmental structures, teaching content and the spatial hierarchy. The applications in the studio could possibly contribute towards a decolonised curriculum as conceptual framework. While planning the curriculum interventions, as a staff body, we were uncertain how to ultimately attain ‘decolonization status’, and felt that we should instead focus on principals of inclusivity in our existing epistemology. We workshopped ideas around our strengths and introduced practical interventions in which decolonisation could begin to be addressed in our studios.

2. Context

The student-led anti-colonial protests erupted violently in 2016 (Biney, 2016, p.385). This was another desperate call to dissolve both the structural and symbolic hold which colonialism has over South African higher education. The “Rhodes must fall, “Fees must fall” and “insourcing of cleaning staff” protests emanates from the same colonial grip from which it was supposedly freed from in 1994 during South Africa’s first democratic elections. These demonstrations were clearly unambiguous markers about the ‘white supremacist’ (Biney, 2016, p.385) thinking which existed from decades before. The protests also highlighted the ignorance of acknowledging a wider culture, gender and ethnicity by higher education policies and practices. “These legacies have created universities in South Africa that alienate, marginalise and discriminate against black students and staff in ways that are both obvious and subtle (Prinsloo, 2016, p.166). Universities has therefore become the central focus of critique because it has not been able to recognize the real actions required in the evolution of its demographics, pedagogical content, its structure and the space in which instruction is carried out. This has remains largely the same. Prinsloo (2016, p.166) refers to the role of universities in that it is one of the few places that should allow and facilitate change as it is the centre of epistemology. Prinsloo (2016) states that “Universities are not static nor are they simply ideological zombies…” (Prinsloo, 2016, p.166) and our paradigms of thinking needs to adjust with the time. Critical thinkers in terms of the feminist movement for example “challenge us to think more deeply about pedagogies and practices and to develop new theories which critique essentialist notions of classed, racialised and gendered subjectivities and at the same time retain the original political vision of the women’s movement…”(David, 2011, p.432) the author draws together the diverse approaches to equity and widening participation found in the innovative international research conducted in Ghana and Tanzania by contrast with those in the \”global North\”, using the United Kingdom as a case study. In particular, the author considers the utility of equity scorecards around the theme of the three Rs--\”recruitment, retention\” and \”results\”--in the context of very diverse national and international cultures and contexts. The focus of these scorecards is on equity in terms of gender, age and socio-economic backgrounds. Using research evidence from the United Kingdom’s Teaching and Learning Research Programme on fair access and widening participation in higher education, the author also draws out further conceptual considerations about equity and diver-

sity as key to developing policies, practices and pedagogies for the future of global universities in the twenty-first century. What are the obstacles and opportunities for envisioning equitable and fair policies, practices and pedagogies for the three Rs to enable and enhance higher education for women and other socio-economically disadvantaged groups? (Contains 1 note.. We must understand what colonialism really is and what it means for South Africans before we Decolonise. In other words, we need to analyse and fundamentally understand the ways in which our colonial and racist past continues to inform economic, political and social realities and, with reference to universities, how it shapes institutional culture, values, practices, processes, appointments, curriculum planning, standards.... (Prinsloo, 2016). It is tightly bound and is "an integral part of the social, political, economic, and cultural relations of society" (Abdullah, Beh, Tahir, Che Ani, & Tawil, 2011, p.28) more so to define the culture of a design studio make out of individualistic and dynamic mind. It is through the students, that each architecture school and architecture program developed their distinct culture. In Malaysia, like other country, the discipline of architecture takes great pride in the diversity of its program and teaching pedagogies. The studio model has its own culture and values that are as influential in a student's education as the actual projects they complete. In many cases, the habits and patterns exhibited in this culture are not the intentional product, but a by-product. These by-products can be very positive, but they can also produce harmful results. Many scholars, like Thomas Dutton and Kathryn Anthony, have called the consequences of this culture the \"hidden curriculum\" of studio learning. In simple terms, the hidden curriculum refers to those unstated values, attitudes, and norms that stem from the social relations of the school and classroom as well as the content of the course (Dutton, 1991).

3. The Status Quo

Therefore, scholars like Biney (2016), David (2011) and Prinsloo (2016) are concerned with the state of inclusivity in higher education. She states that higher education is still dominated by white males. Biney (2006) refers to Latin American scholars (Biney, 2016, p.387) who talks about the 'colonial matrix of power" and the unveiling of "underpinning this entangled web of asymmetrical power relations is a hetero-normative, racialized, patriarchal, and hierarchical world order" (Biney, 2016, p.387). In addition, there is a complacency and resistance to promoting both black

and female academics and learners who must be included in the theorizing, production and practicing of knowledge in higher education. Colonial thinking is based on the premise that Europeans naturally can account for African narratives, knowledge and theory, that black African realities are non-existent and that our ideologies are shaped by their (European) worlds and accounts. It is critical that we ask ourselves 'who are generating these narratives?'; 'from what source?'; 'who are the receivers of information?' and 'how is the information being delivered?' Natives have not only been written out of the generating knowledge but also not been provided the platform to contribute to our society in meaningful ways. Knowledge is not singular account but "plural and equal" (Biney, 2016, p.389).

4. Institutional Strategy

This is not to say that higher education institutions have completely been inactive in implementing decolonized policies and procedures. David (2011, p.435)the author draws together the diverse approaches to equity and widening participation found in the innovative international research conducted in Ghana and Tanzania by contrast with those in the \"global North\", using the United Kingdom as a case study. In particular, the author considers the utility of equity scorecards around the theme of the three Rs--\"recruitment, retention\" and \"results\"--in the context of very diverse national and international cultures and contexts. The focus of these scorecards is on equity in terms of gender, age and socio-economic backgrounds. Using research evidence from the United Kingdom's Teaching and Learning Research Programme on fair access and widening participation in higher education, the author also draws out further conceptual considerations about equity and diversity as key to developing policies, practices and pedagogies for the future of global universities in the twenty-first century. What are the obstacles and opportunities for envisioning equitable and fair policies, practices and pedagogies for the three Rs to enable and enhance higher education for women and other socio-economically disadvantaged groups? (Contains 1 note. articulates that 'academic capitalism' has implemented an inclusive agenda in global higher education. It has developed new policies on active recruitment and enrolment of black staff and students respectively. Black academics and learners have been on the steady increase. However, according to Pillay and Hoffman (Verashni Pillay, n.d.,2009) in the article '"how black

are our universities", statistics reflect that the majority of staff are teaching a balance of black and white students.

Increasing enrolment of black students annually may be a simple administrative task but it's far more challenging to create a diverse academic staff body over a short period of time. Similarly, we cannot expect to increase the numbers of black learners and ignore the paradigm in which colonialist teaching embeds itself in the design studios. Scholars are saying in order to 'decolonise', that increasing diversity of students racial groups are simply not enough (Biney, 2016; DEI, 2016) and we cannot expect to disrupt deep rooted colonial structures because it will still maintain "patterns of control, domination and exploitation" (Biney, 2016, p.385).

In the context of the decolonization conversation is "what is the impact of predominantly white staff teaching black students"? This is a significant enquiry because we need to acknowledge the influence of discourse in the studio. In other words, we have to identify who is talking, what are they saying, how are they saying it and who is listening. We need to also accept that predominant discourse can easily become consensus and therefor become the norm. Teaching and learning does not exist in isolation and that academics have their own context from which they teach. Prinsloo states that role that racist knowledge plays on society is profound. It shapes who we are. *"In other words, we need to analyse the ways in which our colonial and racist past continues to inform economic, political and social realities and, with reference to universities, how it shapes institutional culture, values, practices, processes, appointments, curriculum planning, standards....* (Prinsloo, 2016, p.165).

5. Transforming paradigms of education

Scholars agree that academics need change the paradigm in teaching and what is being done is simply not enough (Biney, 2016; DEI, 2016). Increasing the numbers of black faces of teachers and students and then expecting to disrupt deep rooted colonial structures. It will still maintain "patterns of control, domination and exploitation" (Biney, 2016, p.385).

It will take a while for the higher education to achieve diversity in higher education. Prinsloo suggests that we need to reject a westernise way of thinking. Instead we should re-centre our paradigms of how the west relates to us, and not how we relate to the west (Prinsloo, 2016, p.165).

Dei (Dei, 2016, p.54) states that we need to relearn to learn. We need to be deeply empathic to the learners we are teaching and to develop a

culturally appropriate pedagogy in higher education? It is imperative to include plurality in discourse. Dei (Dei, 2016, p.30) poses multiple questions about achieving such a curriculum. “What curriculum informs the education contemporary learners receive and how do they apply this to their academic and work lives? And “How do educators re-fashion their work as educators and also as learners to create more relevant understandings of what it means to be human and to determine what is human work?” These are just some of the questions Dei (2016, p.25) asks. Learning from these questions also posed an additional threat, how do we approach a new democratic curriculum without losing distinctions about content and methodologies which are relevant and are not rendered on objectivity?

As Dei (2016, p.26) states it’s not easy to “de” colonies. It is at this point which I propose to offer some experience in this area; some reflections to these questions. I do not declare to be any expert in this field, but I believe that these methodologies can be further developed. In addition, not everything we attempted has worked. We have however started to see some qualitative positive results.

6. Interventions

To create an inclusive required 100% buy-in from colleagues and could contribute significantly to a larger cultural transformation in a school of architecture. Through a series workshops the staff body of University of Johannesburg’s Architecture Department developed a series of different approaches to the curriculum which considers inclusive values at its centre. The objective was to disrupt the siloes which have race and gender embedded into deeply into it. We set out in search of a kind of temporal pedagogical utopia.

We chose three areas in the curriculum where we can intervene. Interventions which required unpacking using inclusive teaching values. Firstly, the relationship of staff’s race in relation to the Diploma and Degree programs and years. We found that the two programs were aligned with largely specific racial groups. Diploma were taught by mainly black lecturers and degree mainly white lecturers. Secondly, we incorporated the learners into the developing of the design brief. This relates to the theory that the values of European thinking can find it’s ways into the setting out of a design brief and there is a risk that a learner from a completely different background and values may not relate to the design

brief. This could therefore set the learner up in way that creates additional challenges to succeed. The objective was to move away from the 'designing an artist's studio on a hill' and instead allow learners to co-write the briefs to characters they can vividly relate to. These briefs would bring the learner closer to their understanding of space and architecture. Finally, the hierarchical nature of how space is produced in studios. We intended to flatten the 'master' and 'student' condition and transform the lecturer's role into a contributor knowledge and facilitator of discourse. Allowing the students, a platform to become the agents of knowledge production through peer discussion and debate.

It is important to introduce a short biography of the department of architecture to contextualise the department. We are currently running two programs. The diploma program with an Admission Point Score (APS) score of 25 and the degree program with an APS score of 30. Like most universities in South Africa, the neoliberal influences have mooted a push towards the degree program making the degree program more popular. An integral consideration is the role APS scores can divide two set type if students and these can be related to students coming from more privileged backgrounds are proved the platform and resources to produce higher APS scores and in turn the degree program. This is the opposite case for less privileged backgrounds, low APS scores who have no choice to enter the diploma program. In addition, a similar pattern occurs in teaching. There is a majority of white male lecturers teaching the majority of white affluent students in the degree stream and more black lecturers teaching majority black students in the diploma stream. It was an unspoken observation in the department. It was also unfortunate that a stream-particular student would never have the opportunity to engage with a lecturer from another stream.

6.1 Intervention one: Design Elective studios

As mentioned previously, the department of architecture runs two main streams of architecture ie. the Bachelor of Architecture course, which is the classic architectural design degree, and technical-focused Diploma course. Students navigate their program within the boundaries of their course. This means that learners are taught by specific lecturers who are only assigned to their course modules. Consider that all lecturers each have particular rich skills in design, technology, history, etc. It's reasonable to assume that these students will only be exposed to a specific gen-

re of instruction. The first problem we identified was that this created a silo effect between streams of architecture and this created a rift in the department. In addition, we realised that there was a correlation between Diploma program being taught by black lecturers and the Bachelor of Architecture program being taught by the mostly white lecturers. Finally, with the pressure on academics to produce more research, there was a disconnect between their teaching content and their research.

The first intervention was to create a collaborative theme-focused bi-multidisciplinary design elective studio which formed cohorts of small groups of mixed diploma and bachelor students. Each lecturer in the department developed a design project focused on their own architectural interest and research. This interest was framed and presented to the learners. The learners then had to choose a design elective which aligns with their interests and then voted to participate in the elective of their choice. The number of students in each elective were adjusted so that each elective had a similar number of student bodies. Each elective contained an approximate amount of Diploma, Degree, second and third years students.

Cross-collaborative studios are not new. However, it was important to cross-pollinate the students and lecturers in the light of decolonisation. It also allowed students to exercise choice and have a higher probability of gaining access to a particular elective and area of knowledge. A positive by-product was that students worked collectively and complimented the technical and conceptual skills from the two streams in which they are located. This created a new synergy in studio culture. Finally, students developed a competitive edge amongst electives and years. In conclusion, this elective system encourages new specific areas of thought knowledge as opposed to module and year-based teaching which can be limiting and repetitive. It allowed diploma and bachelor students to renew their appreciation of design and design technology.

6.2 Intervention two: Co-authoring briefs

The second area which we created an inclusive approach in our curriculum was in the content. We located sites in the curriculum which students can contribute to the project by bringing their personal narrative. For example, a design project in first year was a small private structure located in a public space of their choice. As part of the mapping exercise, learners were required to document their own private practice of their

choice. In this way students were allowed to co-author the brief. Learners discussed the premise of their design concept confidently from a personal point of view and could share with others how they arrived at the design aspects of their designs. The architectural process was now owned by the student bringing embodied knowledge to the design process. This is core to inclusive or what Considine (2014, p.18) terms as "culturally responsive teaching" and defines it as "...using the cultural knowledge, prior experiences, and performance styles of diverse students to make learning more appropriate and effective for them; it teaches to and through the strengths of these students (Considine, Mihalick, Mogi-Hein, Penick-Parks, & Van Auken, 2014:1).

Some of the recommendations of Sleeter (Sleeter, 2012:, p.563) states is a very empathic approach of learning. She states that we need to reach 'to and through personal culture strengths", close ethnic identity interactions, background and achievements" (Sleeter, 2012:, p.563). So for example in Sleeter's paper she demonstrate and states the fact that there is a lack of an assumption about culture and race but I think sample referring to origin and identity versus getting to understand and know the student more intimately (Sleeter, 2012, p.571).

6.3 Intervention three: Hierarchy and workshop based

The third intervention we introduced into the first-year studios relates hierarchy in space. Traditionally learners are issued a brief to which they respond. Learners are guided through conceptual and design development of projects to be critiqued by a panel lecturer in a public fashion at the end of the project. We proposed to flatten the master and student structure and instead to facilitate design discussion workshops. These discussions introduce the values of plurality and encourages diversity in discourse. In addition, students were encouraged to participate in peer reviewing as well as restructuring the space from cinema style to central focused seating arrangements to further promote equality of voices in the space.

The relationship between lecturer and learners are significant in the role of inclusive education practice. Traditionally the lecturer embodies and is the source of knowledge. He or she prepares and delivers teaching content and therefore guide students. However, the lecturer is only one voice who has a very specific background and understanding of the world. This contradicts the concept widening discourse to multiple contributions of knowledge and is counterproductive to critical pedagogy.

We therefore need to be aware of a driving monolithic narrative. Narratives determine discourse, and discourse drives values, ideas and truths. It is important in theory of inclusive education that knowledge holders do not assert their dominant views onto their learners. This relationship of assertion in this case is very similar to that colonialist as it mediates all relations into inferior and superior; it inserts hierarchy into the world, between human beings, the planet and nature. Decolonial thinking on the other hand opposes this singular vision of structuring the world and human thinking" (Biney, 2016, p.387). This means if we want to encourage pedagogical change then it has to be "learner-centred". This means "pedagogy requires a complete paradigm shift from an "Instruction" paradigm to a "Learning" paradigm" (Considine et al., 2014, p.19). We should therefore have less delivering of information from the master and encourage more facilitation of discourse amongst learners. The lecturer should create an environment where learners feel free to find their voices in the studio and flourish as critical independent thinkers.

7. Conclusion

Colonial actions have and still marginalise in ways which is both overt and subtle. A structured act of uninvited occupation has led to the gradual erosion and the displacement of native embodied knowledge and culture over time in ways that are difficult to unbundle. It is therefore not an easy task to simply reverse a deep-rooted process such colonialisation. Although we are acutely aware the role colonialism plays in our society, it is important to continually unpack how the process of power affects our worlds by critically reflecting on the practices which embeds itself in our society and our curriculum. These practices are complex. It often unknowingly shapes our worlds. Today, tertiary institutions are making an effort to transform the presence of designated racial groups but it's only the beginning of true transformation. However, there is no road map toultimate decolonization status. There is no clear articulation of how to achieve true diversity in our classrooms and studios. This is up to us to narrate. It is however clear that we need to distil the values which colonialism opposes and not take on the cumbersome task of reversing it. These values require learners, lecturers, program leaders and heads of departments to engage with the approach to curriculum, to understand the extent to which diversity requires to be acknowledged, paradigms needing to be shifted and multi-culturalism to be empathically understood.

When reshaping the curriculum, we need to have a human-centred approach and we need to be cognisant of the net cultural effect. Curriculum planning in design requires constant reflection because is not situated in a vacuum. It's reflects the minds and experiences who teach our learners and directly affects our society and culture. Learners are therefore highly influenced by these processes of planning.

Much literature expresses the need to then become more aware of 'the other' and developing a learner-centred and culturally appropriate approach to our curriculum but I would like to propose that firstly, we actively need to develop values which informs new practices approach curriculums. Practices which have the underpinning to facilitate an equal and flourishing learning environment for all. Secondly, we need to develop the culture to wanting to test new approaches to the curriculum. Academics must reject complacency and challenge the status quo. Often program leaders and heads of schools are resistant to change structure, content and methods of teaching. This can be attributed to trivial aspects of time consuming and territoriality. Thirdly, academics and learners need to understand that we cannot fail in this process. Pursuing an all-encompassing approach to curriculum planning in itself is half the battle won.

The informal feedback from learners and lecturers were both positive and negative about the curriculum interventions. Generally, students felt that the electives were interesting and that it helped to ground the school as a whole. There was a new-found acknowledgement for peers and their skills of different programs and lecturers from different backgrounds. The revised brief intervention which included the narrative of the student demonstrated a new level of confidence. Learners spoke about their private practices boldly and therefore could articulate the concept of their design confidently. They related well to their project. The final intervention, of hierarchical flattening, provided the space for students to value their own contribution amongst their peers and equally contribute to knowledge of the studio group. Learners became more engaged in the studio and developed a supportive role to each other. Learners developed a level of empathy for each other and their learning development. We do intend deepening the interventions and it will include a survey to establish the outcome of the curriculum interventions. These interventions are merely the beginning of a long series of approaches to facilitate a more balanced pedagogy.

With this new information, how do we begin to transform a colonised curriculum formally? Although the second and third interventions are

related to the creation of a studio culture and the values of the lecturer, the first example addresses of re-structuring lecturers and creating electives are a formal application of a decolonised curriculum. Furthermore, we are considering the inclusion of a bridging course for Diploma endorsed students into the Degree program; the elimination of the diploma program because it's riddled with colonial characteristics; and to revise the Bachelor of Architecture program as a diverse and comprehensive degree. The Degree program will give all students the equal exiting opportunity to access further studies or employment.

In conclusion, we must consider that colonialism is an existing inherent complexity and is difficult to reconcile with design curriculum. While design is meaningless. We can only apply new meaning to design. It is the culture which we as lecturers and learners bring to discourse which defines its meaning. Learning in design has no prescribed methodologies. It can occur in a myriad of spaces, processes or conditions. This give us the license to redesign our programs through new and shifting lenses. We define the design of programs through consensus which is appropriate for our time and context, with the necessary values which support a diverse, multi-cultural and learner-centred utopian pedagogical condition for now.

Denver Hendricks
Professor, head of the Department Architecture,
Faculty of Art, Design and Architecture,
University of Johannesburg, South Africa
denverh@uj.ac.za

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Design Thinking as a Meta Language

Stanley Lim, Matthias Hillner

Abstract:

"If you do not deploy design thinking, you are working for yourself." Neal Cross, Managing Director and Chief Innovation Officer of DBS Bank, at Singapore DesignWeek 2017

In his keynote speech at the Design Management Institute conference in London in 2015, Richard Buchanan, professor of design, management, and information systems at the Case Western Reserve University in the USA, distinguishes between design thinking as "a cognitive decision-making process" and design thinking as "a spirit that permeates a culture or an organization".

This paper examines design thinking in Singapore through investigating the way in which three of the country's most critically acclaimed design firms, FITCH, IBM iX and Chemistry, have adopted and adapted design thinking principles in different contexts: retail design, systems design, and social design. The methods used here can be linked to the design thinking methodology as incepted by Stanford University's Hasso Plattner Institute of Design, also referred to as d.School. The pragmatic characteristics of d.School's design thinking process makes it easy to adopt. However, the key question which this paper will raise, is whether or not design thinking can unite a greater range of stakeholders in Singapore, given that the country's Ministry of Communications and Information has elevated design as a key driver through the Design 2025 Master Plan which was issued in 2015. This initiative builds on the other definition of design thinking, the notion of a spirit. This paper discusses how expanding the collaborative attitudes within culture and society can potentially promote design thinking as a 'spirit' within a nation. Could design thinking be reframed to become a language-like concept that connects people and societies in their shared ambition to shape future lives? What are Singapore's prospects with respect to this endeavor?

Theme: Conflicts
Keywords: design thinking, design education, interdisciplinary collaboration, design management, design industry practice

1. Introduction

Interdisciplinary *Clusters* were first introduced at LASALLE College of the Arts' Faculty of Design in August 2016. The objectives of this initiative were "a) to foster research-led ideation and expand on the design process, b) to negotiate broader views [on design] and extend knowledge into other discipline areas, c) to contextualize and reframe design in a larger context and d) to facilitate collaborative work." (LASALLE College of the Arts, 2016, p. 3) To those ends the Faculty devised projects that engaged students from different disciplines. During the second iteration of the *Clusters* initiative, second-year students from the BA(Hons) Design Communication, Product Design and Interior Design programmes worked in interdisciplinary groups to tackle selected Royal Society of the Arts (RSA) Student Awards 2017 briefs. The briefs required that students demonstrate their understanding of design thinking by implementing relevant methodologies in their design process. d.School's design thinking methodology was introduced to students through workshops and class exercises and in addition to that, the programme sought to broaden students' understanding of design thinking by working with various companies who have deployed design thinking in their work. The goal to work with various industry partners was two-pronged, for students and the teaching team. For the students, it was an opportunity to better understand how design thinking methodologies facilitate innovative industry practice. As for the academic team, the hope was that a clearer understanding of how design thinking is deployed in the industry, can facilitate more critical and insightful discussions on how best to teach design thinking in the curriculum. The programme worked with FITCH, IBM iX and Chemistry.

This paper discusses the similarities and differences between the deployment of the design thinking methodologies in these three companies, and it does so by comparison to the methodology proposed by d.School. Thus it provides insights that are hoped to encourage further developments in the context of design thinking.

2. The Rise and Challenges of Design Thinking in Singapore

Design thinking has been championed and promoted as an approach to innovation that businesses can build upon. In Singapore, this charge has been led by the DesignSingapore Council. Established in 2003 as part of

the Ministry of Communications and Information, its mandate is to develop the nation's design sector and industry. The Council regards Singapore's growth in the design sector as a key contributor to the nation's economic and social success: "design will be [our companies'] strategic tool for winning in the marketplace, bringing Singapore to the forefront of the global economy." (DesignSingapore Council, 2016, p. 13) Under its 15 recommendations listed in the Design 2025 Masterplan, the introduction of design thinking to businesses and government have been identified as a key strategy: "Increas[ing] the knowledge and practice of design thinking [and] developing a people-centred design and innovation strategy will elevate organisations towards providing differentiated products and delightful user experiences." (DesignSingapore Council, 2016, p. 31) It further states that, "it is recommended that design thinking and related design courses continue to be offered to public servants to cultivate people-centred design in policy development and problem-solving." (DesignSingapore Council, 2016, p. 32)

The DesignSingapore Council formalized a committee, the Design Thinking & Innovation Academy (DTIA), to manage this key strategy of introducing design thinking. DTIA have organised workshops with various partners to offer training in design thinking as well as special design thinking themed events, such as the recent Innovation by Design Conference 2017, with the objective to "present opportunities for participants to meet and network with leaders in the fields of design, technology and innovation, design thinking, customer experience, human behaviour and organisation transformation." (DesignSingapore Council, 2017) Straits Times, the nation's highest-selling paper, reported in March 2016 that "nearly 9,000 business professionals, educators and students have benefited from design thinking seminars and workshops, according to the DesignSingapore Council." ("Promoting competitiveness through design", 2016, March 15) In 2010, tax incentives were even introduced to provide deductions for businesses adopting design thinking. (Chua, 2010)

Laura Mata Garcia (2012, p. 160) warns that, "The planning and execution of an appropriate design strategy is crucial in order to maximize the potentialities of an organization's design assets. However, many cognitive biases about design and its role in the organization still remain for many managers and decision makers." With such a large interest in design thinking, it can be argued that there will be a reasonably high uptake of the methodology by businesses. However, Carlgren, Elmquist and Rauth (2013, p. 1) stated that, "indications suggest that firms find

implementation [of design thinking] challenging." In an earlier paper, Carlgren et al. state that "DT [design thinking] is described as a as a [sic] user-centered approach to innovation inspired by designers' mindset and ways of working. It is argued that this idea (or idealistic way of working) can be applied to any type of organization, and for any type of application when there is a need for increased innovativeness." (Carlgren, Elmquist and Rauth, 2013, p. 2) This is a problematic starting point and assumption for businesses looking to implement design thinking because it suggests a *one-size-fits-all* approach, ignoring the fact that each business is unique, with its own specific constraints and particularities. It is likely that businesses who are sold on the benefits of design thinking are also hoping to reap immediate financial benefits which can lead to an overzealous implementation of the design thinking without careful consideration. This coupled with the assumption that design thinking is a methodical framework that can be applied instantly, can account for why Carlgren et al. believe that firms find implementation of design thinking challenging (Carlgren, Elmquist and Rauth, 2016). This is especially true if the methodical framework is fundamentally different from the existing working processes and culture in these businesses. Kimbell argues that the successful implementation of design thinking is contingent on a culture that fosters it: "The adoption of design thinking into management education, for example, in the form of tools and methods separated from the culture of design, may not have the desired results." (Kimbell, 2012, p. 143)

This paper discusses a number of businesses who have succeeded not only in implementing design thinking methodologies, but also in adapting those to suit the nature of their businesses.

3. Approaches to design thinking

3.1. D.School

Stanford University's Hasso Plattner Institute of Design, commonly known as d.School, is one of the leading institutions offering courses in design thinking. Plattner (2011) posits that the teaching of collaboration is a focus in the curriculum. The methodology is broken down into five modes or stages (d.School, n.d.):

- *Empathize* – This stage concerns itself with the understanding of design challenges as faced by people. This human-centred focus leads to insights into physical or emotional needs, in the context of the design problem or challenge through activities such as observations and interviews.
- *Define* – This draws upon the insights gained in crafting an "actionable problem statement" (d.School, n.d.), also known as a point of view. Findings from observations and engagement with people are synthesized into a focused statement that will provide direction for the next stage.
- *Ideate* – This mode focuses on idea generation to address the challenges defined in the problem statement. The goal is not to arrive at one solution but many, providing a range of ideas for consideration.
- *Prototype* – It begins with the construction of low-resolution artefacts for quick assessment of functionality and feasibility in addressing the challenges of the design problem. Prototypes can be improved iteratively to achieve a more refined solution
- *Test* – Here is an opportunity for the prototypes to be assessed in a real-life context of the design problem. Users will be encouraged to trial the prototypes and to create new experiences that can serve as learning points for further iteration of the solutions. If the solutions are not ideal, participants will revisit the *Ideate* or *Prototype* mode to either reconsider the challenges and generate new ideas, or improve on the prototypes.

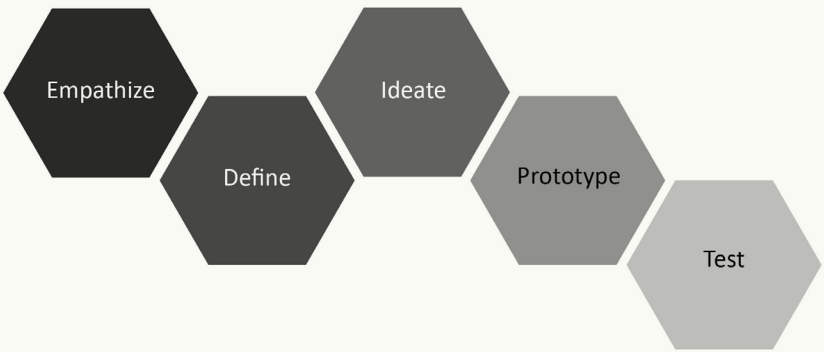


Figure 1. A typical visual representation of the progression and relationship between the five modes of d.School's design thinking Methodology.

The d.School design thinking methodology was identified as a good starting point for the curriculum by the BA(Hons) Design Communication programme at LASALLE as its online resources are abundant, with suggested exercises and tools available. The proposed exercises and stages also offer sufficient flexibility for curriculum managers to adapt to the projects on hand. The documents are distributed under the Creative Commons Attribution-ShareAlike license, allowing programme managers to tweak and build upon them.

3.2. IBM iX Singapore

IBM iX (Interactive Experience) understand themselves as more than an agency but a next-generation service entity. The solutions offered range from Strategy, Creative, Analytics to Platforms, Cloud Business Solutions as well as Management and Operations. (IBM iX Singapore, n.d.) As a multi-national corporation with over 30 branches all over the world, Business Insider reported that IBM iX employ over 10,000 professionals in interdisciplinary teams. (O'Reilly, 2016) In the same article, Paul Papas, global leader for IBM iX added that they have "taken the Stanford School of Design method and tailor[ed] it into something it calls IBM design thinking." (O'Reilly, 2016)

The IBM design thinking methodology is grouped into two models known as the *Loop* and the *Keys*.

Represented as a möbius strip, the *Loop* is a workflow and is a "continuous cycle of observing, reflecting, and making." (IBM, n.d.) The three stages are this model are:

- *Observe* – IBM believes that breakthrough ideas are born from a thorough understanding of real-world problems. This stage requires participants to observe users to uncover needs, understand context and to obtain feedback.
- *Reflect* – With data gained from the observation mode, participants are required to reflect and synthesize 'aha' moments. There is a focus to work with other participants to build upon gathered data and to plan ahead to commit to potential ideas.
- *Make* – This next stage gives form to potential ideas by prototyping ideas and communicating their values. Participants are encouraged to explore outrageous and adventurous ideas.

The next model of the methodology, *Keys*, focuses on project and team management. The following three keys are closely aligned with the three stages of the *Loop*:

- *Hills* – They are a written statement of intent to communicate the focus of a project. The statement should clarify the goals that address the Who (users), What (user needs) and Wow (measure of success). The *Hills* galvanizes and aligns the project team.
- *Playbacks* – They are moments of team management where stakeholders or team members are brought together for feedback. This is akin to a time-out in basketball games where the players and coaches regroup and remind each other of what has been achieved and to realign expectations. The *Hills* are often referred to as they provide direction for the team.
- *Sponsor Users* – They are carefully selected members of the audience, who are often expert users in the area of interest, to trail prototypes and provide feedback. *Sponsor Users* are earmarked based on a careful assessment of the objectives detailed in the *Hills*. Following the feedback, *Sponsor Users* work collaboratively with the project team to improve on the outcomes.

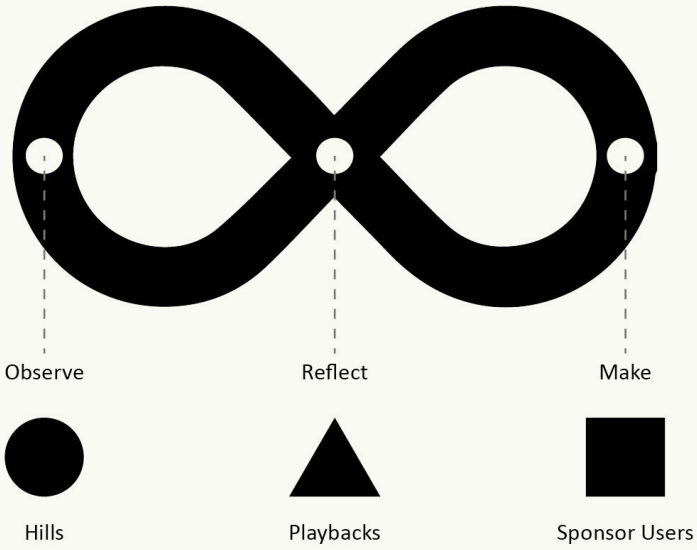


Figure 2. The six stages of IBM design thinking.

The inclusion of team and projection management stages, i.e. *Hills*, *Playbacks* and *Sponsor Users*, works in conjunction with the *Loop*. The *Observe*, *Reflect* and *Make* stages are conducted in a cyclical and iterative fashion, with *Hills*, *Playbacks* and *Sponsor Users* operating at regular intervals.

3.3. FITCH Singapore

FITCH is one of the world's leading retail and branding agency and the unit based in Singapore have been providing consumer-centric services to clients for more than 10 years. There are around 15 employees specializing in retail experience design. The company recognises that the retail shopping experience has changed in recent times with e-commerce. What used to be a straightforward customer journey now goes on detours and turns: "What was once so SIMPLE – 'I'm just popping out to the shops' is now infinitely splintered. Shopping is anywhere and everywhere." (FITCH, 2015) Through research FITCH developed a proprietary design thinking methodology called the 4D Process™:

- *Discover* – This is the research stage when team members model the aforementioned splintered consumer experience. This is done using another FITCH tool called the Mindstate MappingTM, which will be covered further down. The objective of this stage is to establish the current consumer experience of a given brand, product or experience.
- *Define* – Following insights gained from the Mindstate MappingTM tool, team members begin to 'identify weaknesses, missing links and new opportunities for development.' (FITCH, n.d.) The goal of this stage is to agree on a 'Big Idea' that guides the new retail experience.
- *Design* – Team members begin proposing and designing ideas for the new retail experience with the 'Big Idea' as a guiding principle.
- *Deliver* – This is the implementation stage where design solutions are finalized and implemented to reach the target consumer.

The *Discover* stage of the methodology is guided by a proprietary tool that allows team members from FITCH to do a complete assessment of the current retail experience of a given brand, product or experience. The assessment takes the team members into various phases of making a pur-

chase to consider the various decisions. This tool, known as Mindstate MappingTM takes into account four different stages:

- *Dreaming* – Shoppers in this mindstate are looking for "ideas and inspiration [without] fully defined needs and wants." (FITCH, 2015) This mindstate challenges the designer to consider the various activities and attitudes shoppers have when they are looking for ideas or inspiration with respect to a particular brand or product. By studying typical activities and attitudes, new opportunities may arise for designers to leverage on and direct shoppers to focus their attention on their brand, product and/or service. The *Dreaming* state can take place in non-retail environments, where a product, activity or behaviour can trigger a temptation to purchase something.
- *Exploring* – Once shoppers are inspired to make a purchase, they enter the *Exploring* stage where they have a category-specific purchase in mind but they have yet to decide on any particular brand, product and/or service. At this point, they can be easily influenced. Typical activities for this point include browsing (both online and offline) and asking for opinions regarding potential purchases.
- *Locating* – At this state, a specific brand, product and/or service has been decided on. A consumer is actively searching for a product or model they have in mind. This can be in a physical environment such as a shopping mall or supermarket but online searching is becoming more prevalent.

The three stages of the Mindstate MappingTM are shared across all FITCH agencies across the world. The FITCH Singapore team however, believes there is another mind state to consider, after a consumer purchases a product or service. They termed this state, *Achieving*.

- *Achieving* – The FITCH Singapore team believes that the post-purchase experience is not to be ignored because successful after-sale engagement can ensure that the consumer returns. Designers need to consider how a brand, product or service can provide excellent after-sales advice, building and connecting consumers to a community of consumers, and help them get the most out of their purchase. The long-term goal is to ensure that consumers become loyal to the brand, product or service, which can lead to future sales or word-of-mouth exposure.

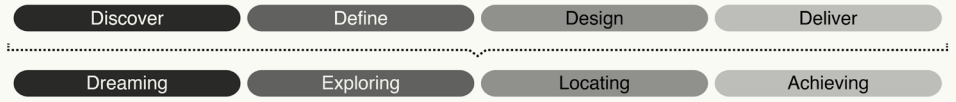


Figure 3. The four stages of FITCH Singapore's design thinking (top) and the Mindstate MappingTM (bottom)

The 4D ProcessTM is fairly systematic in its approach, with an emphasis on the *Discover* stage of the process through the DELA Mindstate MappingTM.

3.4. Chemistry Singapore

Based in Singapore and established in 2000, Chemistry is a design consultancy that "appl[ies] a systematic approach to problem solving, using design as a strategic tool to help organisations foster innovation and create compelling customer experiences." (Chemistry, n.d.) The consultancy employs about 10 designers and have developed solutions through human-centred insights for companies in healthcare, hospitality and consumer electronics. Their work with the government agencies in Singapore focuses on social design. The company also conducts design thinking workshops with government agencies, companies and educational institutions.

Bassam Jabry, Partner and Managing Director of Chemistry, believes the company's design thinking methodology comprises three core principles:

- *Human-Centred and Empathic* – There is a focus on developing an understanding of human needs and this is achieved through qualitative research methods.
- *Cross-Disciplinary and Collaborative* – Chemistry believes that design thinking is at its most effective when it is cross-disciplinary. New possibilities and ideas are birthed from thinking outside established boundaries. (Jabry, 2016)
- *Iterative and Experimental* – This principle informs Chemistry's approach of arriving at design solutions, one that iterates through prototypes.

Chemistry's design thinking methodology can be articulated in four stages:

- *Human-Centred Research* – At this stage, qualitative research methods are used to build empathy with various stakeholders to discover issues and insights surrounding the challenges or problems that they face. Ethnographic research is conducted through observations, shadowing and interviews for Chemistry's team members to establish first-hand knowledge of the human experience. Karin Aue, Partner and Design Director of Communication and Experience Design with Chemistry explains: "This form of research allows us to uncover insights around what motivates our users, their worries, aspirations and the thought processes behind their actions, or non-actions." (as cited in Koh, 2013, p. 55)
- *Ideation* – This stage requires team members to possess the "[...] ability to think freely, translating those people insights into new ideas." (Jabry, 2016) Chemistry believes that having a cross-disciplinary team with diverse life-experiences can be catalyst for developing novel and effective ideas. (Leong, 2014)
- *Iterative Prototyping* – Shortlisted ideas are prototyped in a rapid fashion as they go through iterative rounds of improvement. The goal of this stage is to constantly refine on the design solutions as a proof of concept quickly by "giving them room to grow, and sometimes fail, allow[ing] them to evolve into a robust solution that can be implemented." (Jabry, 2016)
- *Implementation* – During this stage, the most promising ideas are finalised and put to the test within their respective context. Selected solutions are implemented and take on the form of multiple platforms and media in line with cross-disciplinary makeup of the Chemistry team.

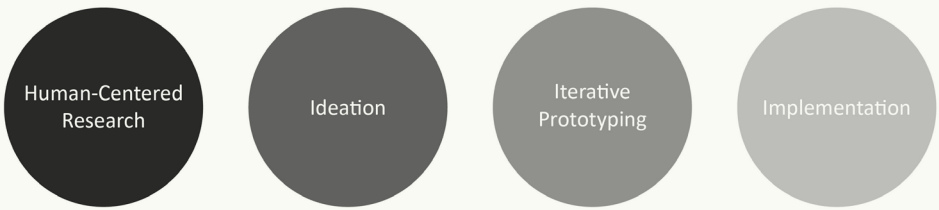


Figure 4. The four stages of Chemistry's design thinking methodology

4. Similarities and Differences

It can be argued that the d.School methodology presents a fundamental structure that can be built upon. That is not to say that the methodology is not comprehensive. As an academic institution offering design thinking courses, its methodology needs to be adaptable to a large variety of conditions. This flexible nature makes it ideal to compare the various approaches of design thinking against it.

In figure five, the stages of the earlier mentioned approaches of design thinking are mapped against d.School's methodology to highlight their relationship with each other.

It appears that the d.School design thinking methodology provides a useful reference framework. The various stages of each of the three case studies cover all five steps of the d.School process, *Empathize*, *Define*, *Ideate*, *Prototype* and *Test*. This suggests that these five components might be essential to the development of an effective design thinking methodology.

All of the three examples discussed, have a stage entirely devoted to research and to generating an understanding of the context of the issue that needs resolving. This indicates that design thinking works in a real-world context where designers and researchers do not rely on mere assumptions with respect to the problems that are to be solved. Unlike the other process stages, where each company has developed their own workflow structure, the *Empathize* component, remains unaltered and represents an integral part of the design thinking process used by each of the three companies. We can conclude that design thinking processes can and should be adapted to the specific characteristics of the problems

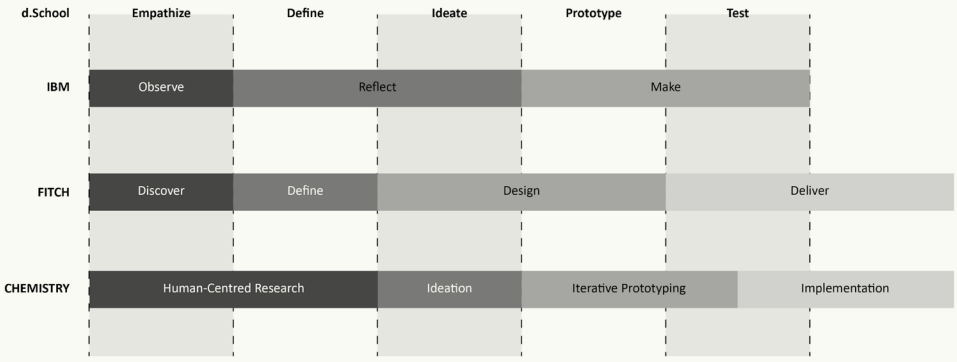


Figure 5. The various approaches to design thinking in comparison to the five steps of the d.School design thinking process

that require solving, to the context within which the problem is found, and in alignment with the working preferences of those involved in the design process, e.g. designers, clients, customers.

5. Design Thinking in Singapore

During a presentation at Singapore DesignWeek, Neal Cross, Managing Director and Chief Innovation Officer of DBS Bank explained that "If you do not deploy design thinking, you are working for yourself." (Neal Cross, 2017) None of the other presentations related to design thinking went beyond the notion of design thinking as a method of collaborative ideas processing.

Richard Buchanan, professor of design, management, and information systems at the Case Western Reserve University in the USA, takes the notion of design thinking further than the co-creative concept. According to Buchanan, design thinking can be defined in four fundamentally different ways:

1. An imaginative act
2. A cognitive decision-making process
3. A spirit that permeates a culture or an organization
4. A discipline or a practice

Buchanan, keynote speech DMI, London, 2015

All of the methods discussed in the previous two sections as well as Cross' concept can be linked directly or indirectly to the design thinking method that was once incepted by Stanford University's Hasso Plattner Institute of Design, which falls into the second category articulated by Buchanan. This logical step-by-step process is very useful. It can be taught, practiced and shared amongst designers and non-designers. Thekind of design thinking, which Buchanan promotes, the third option listed above, does not necessarily contradict this paradigm, but it transcends it. Design thinking becomes part of a culture. But how can this be achieved?

Singapore recognises the benefit of innovation for culture and society as well as for the local economy. In their ambition to foster an innovation-driven economy, the Design 2025 Committee have identified '5 strategic thrusts' (see figure 6). Fifteen specific recommendations are distributed in line with these five action points. The agenda is supposed to have been fully rolled out by 2025.

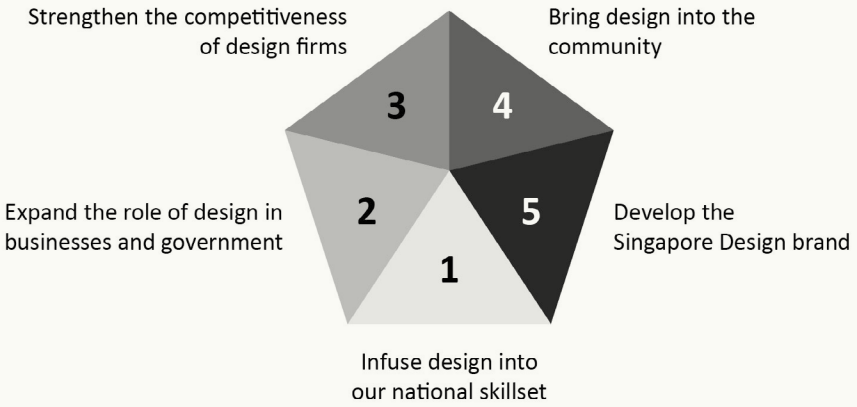


Figure 6. Five action points to promote design in Singapore

Singapore's 2025 Masterplan is aimed at spreading design awareness, sensitivity and creativity amongst its future generation of decision makers. Community engagement projects help to raise awareness for the significance of design within the public. Engaging in design at business management and government level helps to promote design(erly) thinking in sectors which are not design-led by default. Teaching design as well as design thinking at secondary school level fosters awareness for and curiosity about design amongst future generations.

What might potentially happen in Singapore, is that design thinking is elevated from a method or a methodology to an ethos. Instead of being used simply as a tool that is deployed momentarily, it becomes something that pervades the thinking of a majority of Singaporean citizens. No longer just a series of activities to be conducted in prescribed order, design would then become an undercurrent, a shared attitude that guides people's decision making. Design thinking then becomes common place. That, at least, is the hypothesis.

But what is the critical difference between design thinking as a method, and design thinking as an ethos? The authors of 'Design Thinking for the Greater Good' may help to find an answer to this question. They connect design thinking with social design on the one hand, and with the notion of the citizen designer on the other.

According to Liedka et al. the innovation processes that are exclusive to trained designers constitute "an outmoded tool kit premised on predictability and control" (Liedtka et al., 2017, p.5) The authors highlight

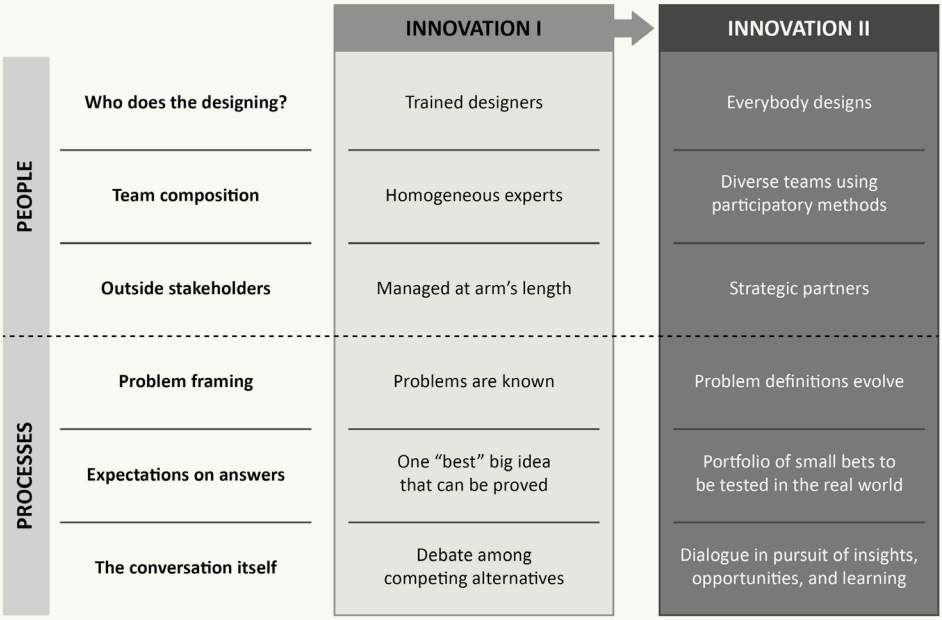


Figure 7. The shift from Innovation I to Innovation II according to Lietka et al.

that challenges in the social sector require the active engagement of non-designers, and a co-creative approach. As a consequence, design thinking is now being spread across "charitable foundations, social innovation start-ups, global corporations, national governments, and elementary schools" (Lietka et al., 2017, p.6). This leads to a democratisation of innovation which Lietka and her co-authors refer to as *Innovation II* (Lietka et al., 2017, p.7). Social innovation challenges are complex, and require a speculative design approach. *Innovation II* is not a finite process, but an ongoing engagement with social issues.

Lietka et al. argue that design thinking in the context of *Innovation II* encourages "distinct shifts in mindsets and behaviours" (Lietka et al., 2017, p.8). So can design thinking be seen as a language-like concept that connects people and societies in their shared ambition to shape future lives? Considering the fact that language can be defined as an articulation of thought that allows people to exchange ideas and concepts, one would be inclined to say *yes*. But rather than an articulation of thought, design thinking might be the thought itself. Then again, how do we draw the line between language and thought, if that is possible at all? In rela-

tion to design, our thoughts are now being reframed through a new paradigm, and it is this new paradigm that reshapes attitudes and behaviours, and it potentially connects people. The difficulty with multiple concepts of design thinking spread across society, is that design thinking can divide people as much as it may connect them, not dissimilar to language itself. Whether or not design thinking will unite people in Singapore or elsewhere depends on how relevant principles are framed, articulated, and implemented. We may argue that design thinking per se does not constitute a language. It is a concept that needs reasonably coherent articulation and continuous discourse in order to prevail as a connecting framework. It then becomes a way of thinking that enables people to enhance their lives and that of others.

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Stanley Lim
Lecturer, Design Communication,
Faculty of Design, LASALLE College of the Arts, Singapore
stanley.lim@lasalle.edu.sg

Matthias Hillner
Head of School, Design Communication
matthias.hillner@lasalle.edu.sg

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Introducing Teamworking Workshops to Enhance the Effectiveness of Interdisciplinary Design Education

Stanley Lim, Joselyn Sim

Abstract

Donald Norman (2010), in his article titled Why Design Education Must Change, advocated an interdisciplinary approach in design pedagogy that allows us to nurture "[...] new kinds of designers, people who can work across disciplines [...]." In order for designers to function effectively in the increasingly complex society we live in, it is imperative that they operate in interdisciplinary teams, to collaborate and coordinate with experts from different fields. This implies that designers will need to be equipped with project management and teamwork skills.

In the case of the Faculty of Design in LASALLE College of the Arts Singapore, the push for interdisciplinarity manifested itself in an initiative in the Bachelor's programme termed Clusters. Students from different design programmes worked in interdisciplinary groups on briefs that were designed to harness the strengths of the various disciplines. Teamworking challenges were observed and reported during the inaugural run of Clusters. It is commonly assumed that students will develop teamworking skills organically in the process to overcome these challenges (Larson, et al., 2015). However, without equipping students with these skills, issues are bound to surface that can affect the success of such interdisciplinary projects.

The paper focuses on the teamwork-oriented approach of the second cycle of Clusters, during which workshops were introduced to prevent and circumvent teamwork problems identified. Tucker's (2016) "Input-Process-Output Framework of Effectiveness in Student Design Teams" was adapted to develop a model that categorises various tools and exercises aimed at addressing challenges during the different processes of a teamworking experience.

This paper concludes with the insights gathered from the teaching of teamwork skills. The model, tools and exercises presented are of value to design educators and curriculum managers who seek to improve students' perception of teamwork and development of teamwork skills.

Theme: Conflicts
Keywords: teamwork, design education, interdisciplinary

1. Introduction

This paper discusses the importance of teaching teamwork in interdisciplinary projects in the face of increasing pressure for interdisciplinarity in design education. The interdisciplinary project initiative termed *Clusters*, that was introduced in the LASALLE College of the Arts, Faculty of Design will be examined. Following the conclusion of the first run of *Clusters*, alist of teamworking problems in student groups were identified. In order to prevent or circumvent these teamworking issues, workshops were developed to introduce teamwork tools and exercises to students in the second cycle of *Clusters*. Tucker's (2016) *Input-Process-Output Framework of Effectiveness in Student Design Teams* was adapted to structure a model that categorised tools and exercises in a manner that allowed lecturers to provide timely support for the development of teamwork skills. This paper describes the tools and exercises and concludes with insights gathered from the teaching of teamwork that may improve teaching and learning strategies of teamwork in interdisciplinary student projects.

2. Interdisciplinarity in Design Education

The notion of interdisciplinarity in design education is hardly new. Founded in 1919, the Bauhaus is a predecessor of interdisciplinary approaches in design education where they strove "[...] to bring together all creative effort into one whole, to reunify all the disciplines of practical art [...]" (Gropius, 1919, cited in Wingler, 1978, p.32). Under the vision of Walter Gropius, followed by Hannes Meyer and later Mies van der Rohe, Bauhaus' novel interdisciplinary model integrated various forms of art in the hopes of nurturing a holistic artist or designer with the cross-fertilization of influences.

During the turbulent period of World War II, many luminaries of the Bauhaus school fled Germany. The Black Mountain College (BMC) in North Carolina, United States, founded in 1933, became home to some of them, namely Walter Gropius, Alexander "Xanti" Schawinsky, Josef Albers and Anni Albers. BMC became a hotbed for experimental design education where collaboration and interdisciplinarity were at its core.

Post World War II in 1953, Hochschule für Gestaltung Ulm (HfG, Ulm School of Design) envisioned an approach to education and curriculum design that may be termed as interdisciplinary (Oswald, 2013). It championed a curriculum that integrated multiple scientific and design disciplines.

However, from the late 1950s to early 1960s, the focus of design education began to shift, as specialist training became the preferred courses.

Academics saw more benefits in specialised courses compared to interdisciplinary ones, as "interdisciplinary courses were labelled as counter to the spirit of specialized academic research" (Berlin, J.A., 1987, p.92). The need for specialised skills in the industry was also a motivating factor for this change in paradigm (Klein, 1990). From the late 20th century, design education began to shift its focus from interdisciplinary models to specialised courses for specific pathways of design.

3. The Demands on Design and their Influence on Design Education

Design education today is going through a change in paradigm, although one may argue it is more of a reinstatement rather than a change. Klein (2004, p.3) posits that, "Historical separations of disciplines are still inherent in the way that universities function but they are eroding and even becoming obsolete in some areas." This eroding of disciplinary silos and return to an interdisciplinary focus is a reflection of the complex interconnected society that we live in.

Designers of today are asked to tackle problems beyond what was required of them in the past. Norman (2010) explains: "Where once industrial designers focused primarily upon form and function, materials and manufacturing, today's issues are far more complex and challenging." Although Norman referred to industrial designers, the same can be said for designers of other disciplines. Designers are now expected to tackle increasingly intricate and diverse problems that involve economic, social, cultural, political and technological issues. Davis (2012, p. 113) is right to say that, "These changes have altered how a young designer enters practice." How these young designers are prepared for the environment that they will eventually operate in, falls squarely on the shoulders of design education (Friedman, 2012). There is now an increasing need for design education to provide students with experience in interdisciplinary projects. These non-domain-specific experiences can give students an edge as they progress into post-study employment because the industry demands designers with "interdisciplinary collaboration, communication skills and knowledge-bases of dependent domains" (Nae, 2017, p. S836).

If designers desire to have an impact on present-day complex societal problems in a meaningful and effective way, it is imperative that they operate in interdisciplinary teams, to collaborate and coordinate with experts from different fields (Davis, 2012). In a study conducted by

the Design Council (2007) on the design process of global design firms such as LEGO, Alessi, SONY and Microsoft, it was established that collaboration across disciplines is a requirement for success. Hence is it essential that designers are well equipped with project management and teamwork skills.

4. Interdisciplinary Design Education in LASALLE College of the Arts' Faculty of Design

Founded in 1984, LASALLE College of the Arts is a tertiary education institution in Singapore. Design programmes are offered under three schools: School of Design Communication, School of Fashion and School of Spatial and Product Design.

The various design programmes have had cross-disciplinary projects in the past. Most of these were brokered by individual programme managers with other programmes within the Faculty, College, other institutions or industry partners. These collaborations were mostly on an ad-hoc basis, with only a handful having a longer vision and sustaining over a number of years. Recognising the need for graduates to have experience in interdisciplinary collaboration, conversations began in 2015 to incorporate mandatory interdisciplinary projects in the curriculum. The resulting initiative, termed *Clusters*, was the Faculty of Design's first major foray into systematising interdisciplinary collaboration in all of its programmes.

Nae (2017) describes three different approaches of cross-disciplinary models most commonly deployed in design education. The first is an introduction of broad subjects in the foundation year to build a skill base for future expansion. The second allows for integration of minors or tracks that students can opt-in for. The third is a model of collaboration that includes variations of team-focused curriculums and shared cross-discipline courses. It is this third model that the Faculty of Design in LASALLE has adopted for its *Clusters* initiative.

Clusters was first introduced in August 2016 with BA(Hons) third-year students from Design Communication, Fashion Design, Fashion Media and Industries, Interior Design and Product Design. Students had a choice of seven thematic focus areas, which were innovation, design futures, curation, designed environments, social enterprise, cultural influences and design criticism. 252 students were grouped into interdisciplinary teams to tackle briefs that were designed to harness the strengths of their

various disciplines. Over a period of seven weeks, students worked towards the completion of their proposals that included a series of presentation boards articulating their ideas and research, along with a journal documenting the progress of their developments.

Following the conclusion of *Clusters*, a survey was administered to gauge the students' perception of the initiative. Results in the survey showed that 79.3% of the respondents agreed that the initiative was an enhancement to their learning. However, based on lecturers' observations and the survey results, many students had difficulties with teamwork. One of the respondents shared about difficulties with workload distribution: "it wasn't easy for those of us who had to carry multiple people in the group. It was taxing on the two of us who had to support and literally hand hold the other group members through the process of collaboration. It was frankly frustrating and tiring." Some respondents expressed issues with group communication: "[individuals in] my group were not willing to voice their opinions or make any decisions without me relentlessly encouraging them to do so," and "it would be great if the in-class activities/briefs [...] allow us to voice our opinions [...]." Subsequent discussions were held with students to further understand the teamwork issues faced, and together with the survey results and observations from lecturers, the following problems were identified:

- Misaligned expectations of the capabilities of members from different disciplinary backgrounds
- Lack of leadership or unclear leadership responsibilities
- Multiple channels of communication within teams
- Domination of discussion and decision making by a select few
- Lack of participation during discussions
- Excessive and unproductive meetings
- Unclear distribution of workload and responsibilities
- Miscommunication of plans and weekly objectives
- Contributions or ideas not being acknowledged or considered
- No clear strategy to decision making on ideas
- Unresolved conflicts among team members
- Lack of opportunities to provide feedback to peers or lecturers

These teamworking issues could have been anticipated given that students had little to no prior experience in teamwork but were required to work with unfamiliar team members in a high-pressure interdisciplinary

fashion. Norman (2011) warns that distrust and animosity frequently arise from teamwork. Yet design educators falsely assume that students will overcome their differences and develop teamworking skills organically in the process (Larson et al., 2015). This problem is not unique as Ostwald (2016, p. xv) explains that, "[...] there has been a general reluctance (either an unwillingness or inability) to emphasize the importance or [sic] team processes, or embed the development of team skills, in undergraduate design curricula." Without equipping students with teamworking skills, such issues are bound to surface. This not only affects the success of projects but also students' perception of teamwork, creating resistance towards future collaboration. As issues frequently arise in a teamworking environment, especially so for interdisciplinary projects, it is important to teach teamworking skills. This importance is further highlighted by the increasing need and value of interdisciplinary collaborations.

If we are to ensure success in interdisciplinary design education, a systematic approach to teaching teamwork is necessary. It may be argued that the teaching of teamworking tools should take precedence over the deliverables for an interdisciplinary collaborative brief, especially if students had little to no prior experience in teamworking. In such cases, the approach to interdisciplinary collaboration should be teamwork-oriented and not project-driven.

5. Teaching Teamwork

In the second cycle of the *Clusters* initiative in January 2017, second-year BA(Hons) students in Design Communication, Interior Design and Product Design tackled the Royal Society of Arts (RSA) Student Awards 2017 briefs. 160 students were given a choice of briefs from the RSA Student Awards that were pre-selected by lecturers. These briefs were selected for their interdisciplinary nature that required non-domain-specific solutions. The RSA briefs required students to implement the use of design thinking in their proposed solutions and they were guided through d. School (n.d.) design thinking methodology (see Figure 1.).

Unlike its inaugural run, the second iteration of *Clusters* included weekly workshops to teach different teamworking tools to students. The objective of the workshops was to support students' development of teamwork skills by introducing tools and exercises that they can utilise in their group work to address prevalent teamworking problems identified from the first cycle of *Clusters* (see Figure 2.).



Figure 1. A visualisation of the five stages in d. School's (n.d.) design thinking methodology.

Identified Teamwork Problems	Tools/Exercises
Misaligned expectations of the capabilities of members from different disciplinary backgrounds	• Appreciating expertise • Sharing strengths and weakness
Lack of leadership or unclear leadership responsibilities	• Appointing team leader • Discussing prior teamwork experience
Multiple channels of communication within teams	• Agreeing on modes of communication
Domination of discussion and decision making by a select few	• Preparing individual contribution before group discussion • Listening before providing feedback • Establishing roles and responsibilities
Lack of participation during discussions	
Excessive and unproductive meetings	• Setting meeting agendas • Establishing roles and responsibilities • Managing plans and information
Unclear distribution of workload and responsibilities	
Miscommunication of plans and weekly objectives	
Contributions or ideas not being acknowledged or considered	• Generating ideas • Prototyping for evaluation • Giving constructive criticism • Practicing self-criticism
No clear strategy to decision making on ideas	• Using selection criteria • Enforcing transparency
Unresolved conflicts among team members	• Acknowledging conflict • Addressing Conflict
Lack of opportunities to provide feedback to peers or lecturers	• Journaling teamwork experience • Performing self- and peer-assessments • Reflecting on teamwork experience • Reviewing journals

Figure 2. Mapping of tools and exercises to address identified teamwork problems from the first cycle of Clusters.

Tucker's (2016) *Input-Process-Output Framework of Effectiveness in Student Design Teams* (see Figure 3.) provided a means to understand the teamworking process by identifying key factors that influence the success of student design teams.

This paper adapted Tucker's (2016) framework on teamwork to categorise the teamworking tools and exercises (see Figure 4.). Insights were also drawn from the two cycles of *Clusters* to refine and improve the tools and exercises, which were then used for subsequent team projects.

These categories were also aligned to the various stages of the d.School design thinking methodology. Lecturers anticipate potential teamwork issues that arise at each stage in d.School's design thinking methodology and introduce relevant tools and exercises in tandem with the various stages.

In addition to Tucker's (2016) framework, he also proposed teaching strategies and teamwork skills to be taught in correlation with each factor. His recommendation was to have different teamwork skills taught to students of each year group: first-year students are taught skills in communication, idea development and reflection, and second-year students coordination, decision making, conflict management and team theory (Tucker, 2016). Final-year students are then given the opportunity to apply all the skills in a cross-disciplinary project. While this paper agrees that scaffolding is important in the development of teamwork skills as Tucker (2016) suggested, the segregated teaching of skills across two year groups means that students are unable to iteratively practice the full suite of teamwork skills. In order for students to gain teamwork skills, they should be given frequent opportunities to apply the full set of skills in practical scenarios. Instead of teaching teamwork skills incrementally across two years, scaling the scope, duration, team size and assessable weighting of projects for each year group may be a more effective method to master teamwork. These project specifications can be increased as students advance in their education. This allows students to apply the full suite of teamwork skills iteratively throughout the undergraduate curricula.

Hamlyn-Harris et al. (as cited in Tucker, 2016, p.9), highlighted that "A two-day teamwork skills workshop was found to have a significant correlation with teamwork satisfaction for students [...]." However, it can be argued that the teaching of teamwork skills should not be through a stand-alone workshop that is removed from the collaborative project that students are undertaking. This is especially so if students have had little

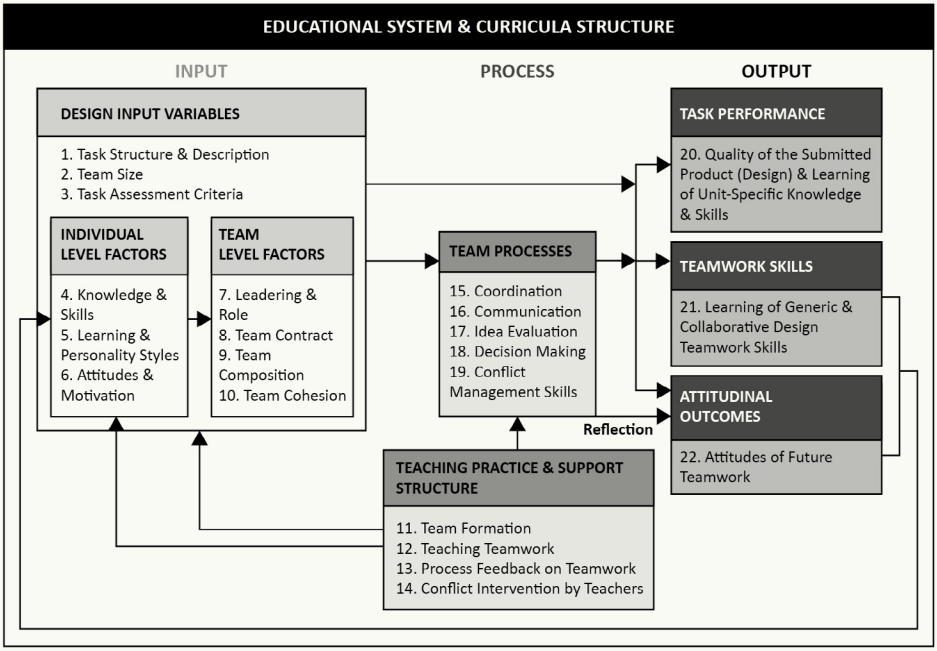


Figure 3. The Input-Process-Output Framework of Effectiveness in Student Design Teams (Tucker, 2016) outlines the factors that affect the success of student teamwork. The above framework was adapted to categorise teamworking tools and exercises (see Figure 4.).

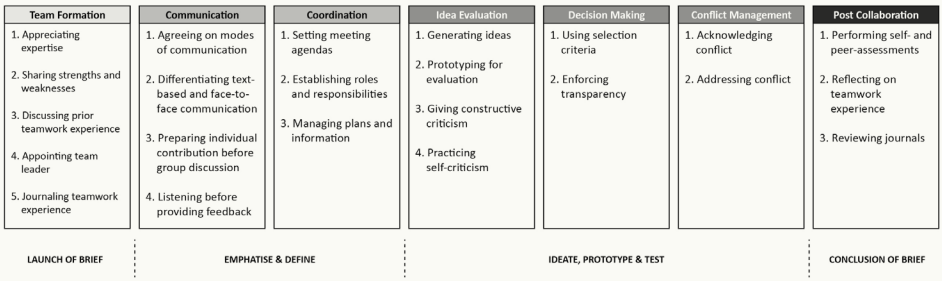


Figure 4. Teamworking tools and exercises were organised into categories adapted from Tucker's (2016) Input-Process-Output Framework of Effectiveness in Student Design Teams. The categorises were also aligned to d.School's design thinking methodology that students were expected to implement in their work.

to no experience in teamworking processes. Relevant tools and exercises taught immediately before each stage of the teamworking process allows students to be familiarised with the tools and to promptly utilise them to overcome potential challenges that may arise in each stage.

The section below describes the various tools and exercises categorised based on the teamworking processes outlined in Tucker's (2016) framework (see Figure 4.) that were delivered based on the above proposed teaching model.

5.1 Team Formation

Following are the descriptions of the Team Formation tools and exercises:

1. *Appreciating expertise*
   Students were tasked to present their portfolios and areas of expertise to their team members so that they can foster an understanding and appreciation for the various disciplinary competencies and knowledge of each member.
2. *Sharing strengths and weaknesses*
   Students were required to reflect upon and share their strengths and weakness in non-discipline-specific areas such as time management, idea generation, research, access to certain forms of resources, etc. This allows team members to assess and build an understanding of each other's teamwork capabilities.
3. *Discussing prior teamwork experience*
   The discussion of individual students' past teamwork experiences can cultivate an understanding of the expectations and anxieties that each member brings to a project. Students had to recall and discuss what they have learnt from previous experiences, as well as the difficulties they faced. This builds empathy between team members and helps to prevent conflicts. Teams were also provided with a list of key attributes that define an effective team for discussion. They were able to add other attributes to establish the team's list of mutually agreed upon attributes.
4. *Appointing team leader*
   Lecturers provided a list of common responsibilities of student team leaders.

   Using this list, students were guided through an exercise to specify their personal expectations of a leader, before discussing

and agreeing with the team to establish a consolidated list of expected responsibilities. This shared understanding can aid in the appointment of the leader.

The above three Team Formation exercises also aid in the evaluation of the member who is most suited to be the team leader, instead of relying on arbitrary factors such as personal relationships or subjective first impressions.

5. *Journaling teamwork experience*
Students were instructed to articulate and document their teamworking processes in their journals throughout the project, paying close attention to the challenges and lessons learnt from teamwork. Emphasis was placed not just on the progression of the project outcomes but also on the importance of building teamworking skills.

5.2 Communication

Following are the descriptions of the Communication tools and exercises:

6. *Agreeing on modes of communication*
A task was set to discuss the various modes of communication at students' disposal and to assess the pros and cons of each mode. They then arrived at a decision on a preferred mode of communication for the team. Lecturers also led a discussion on negative forms of communication such as splintered small group decision-making and the dangers of gossiping.
7. *Differentiating text-based and face-to-face communication*
Students were guided through the differences between face-to-face communication and text-based communication, i.e. emails and instant text messaging. They were also instructed to deal with critical design decisions, conflicts or disagreements face-to-face as text-based forms of communication can lead to misunderstandings and further exacerbate conflicts.
8. *Preparing individual contribution before group discussion*
Students were engaged in a discussion regarding the research direction for the team's next meeting. For the first part of the exercise, students were tasked to review the available research individually before the group discussion, to identify gaps and provide suggestions for research activities. This was followed by a presen-

tation of each member's views and suggestions during the group meeting. The exercise was repeated in workshops where decision making was required. This prevented the domination of discussions and decision making by outspoken individuals in the group.

9. *Listening before providing feedback*
   As part of the previous exercise, students were discouraged from interjecting with comments or questions during presentations. Comments had to be noted down and discussed after everyone had presented their ideas.

5.3 Coordination

Following are the descriptions of the Coordination tools and exercises:

10. *Setting meeting agendas*
    In order to prevent unstructured and unproductive meetings, students were provided with templates and examples of meeting agendas, followed by an exercise on structuring effective meeting agendas. Students were tasked to create an agenda individually before sharing them with their groups. This facilitated discussion amongst the groups on critical agenda items and together as a group, they finalised an agenda for their next meeting.
11. *Establishing roles and responsibilities*
    As part of the agenda writing exercise, students had to establish precise individual roles and responsibilities to fulfil the agenda items. In order to assign the workload and responsibilities, students were guided to use exercises discussed in "5.1 Team Formation" to evaluate existing competencies, prior experiences and access to resources. Together with a review of the timeframe and complexity of the tasks, students arrived at collective decisions in the assignment of roles and responsibilities. This ensures that each decision made is a strategic one.

    The assigned workload and responsibilities were then discussed through an open dialogue within the team to allow each member to express their further opinions and clarify what is expected of them. Expected individual contributions were then noted in the meeting notes/agendas for follow up in the next meeting.
12. *Managing plans and information*
    Students were introduced to various digital collaborative tools

such as Google Apps and Drive, Trello and Asana, to create shared working folders. This allowed knowledge produced during the project, meeting agendas and the team decisions made to be consistently documented and shared with all team members. These folders have the added benefit of allowing lecturers to monitor the working progress of students.

5.4 Idea Evaluation

Following are the descriptions of the Idea Evaluation tools and exercises:

13. *Generating ideas*
    Students were guided through various brainstorming techniques and were told to defer judgement in the initial stages of the brainstorming session so that all members can participate effectively in the brainstorming process.
14. *Prototyping for evaluation*
    Prototyping can be an effective means of evaluating an idea. Following the brainstorming sessions, students were tasked to build prototypes before appraising each other's ideas. Students were also encouraged to prototype or present another team member's ideas. By taking on the role of "selling" someone else's ideas, it can foster empathy and understanding of each other's point of view.
15. *Giving constructive criticism*
    In the evaluation of ideas, it is necessary that we move beyond the obvious and provide critical insights on improvement while highlighting strengths. Students were guided on how to provide constructive criticism using the Sandwich Model of feedback (see Figure 5.).

    They were instructed to separate the ideas from the individual in their feedback. This allowed students to structure their feedback in a constructive manner. Students were also required to provide actionable suggestions for improvements on the ideas.



Figure 5. Example of the Sandwich model of feedback.

16. *Practicing self-criticism*
    Adding on to the previous exercise, students were also tasked to perform the same feedback model on their own ideas or prototype. This personal examination offers an opportunity for students to assess their ideas against their peers, which can in turn encourage a more critical self-assessment of their own ideas.

5.5 Decision Making

Following are the descriptions of the Decision Making tools and exercises:

17. *Using selection criteria*
    Students were required to formulate a list of criteria that can aid them in their decision-making process. Students were guided to break down the selection criteria in project briefs into objectives that can assist in the strategic assessment of ideas. Students also factored in other areas of consideration such as timeline, technical expertise and depth of content, as part of their decision making. A strategic approach to decision making removes uncertainty and breeds confidence in team members.
18. *Enforcing transparency*
    Students were guided through an exercise where they had to decide on an idea or prototype for the project. Using the selection criteria exercise above, students had to score each idea individually before comparing results in a dialogue with the rest of the team members to reach a collective decision. This ensured that the decision-making process was transparent.

5.6 Conflict Management

Following are the descriptions of the Conflict Management tools and exercises:

19. *Acknowledging conflict*
    Students were taught to identify early signs of conflicts, such as impressions of unfair distribution of workload, constant disagreements over non-consequential matters, feelings of anger or anxiety, unproductive members, etc. They were also taught to recognise positive conflicts that can arise from differences in opinions

and ideas, which can push the team to perform better. This equipped students with the skills to acknowledge conflicts, instead of ignoring them.

20. *Addressing Conflict*
After acknowledging conflict, the team must then move on to resolving it. Students were briefed on two approaches to conflict management: 1) resolving the conflict within the student team, and 2) escalating it to the lecturers. The first approach is preferred, especially if the conflict is identified early. Emphasis was placed on this approach as it is a meaningful learning point for conflict management.

    For the first approach, students were guided on how to discuss within their team the potential challenges faced that may have caused the conflict. It is important that affected members have an opportunity to voice their point of view. Students may revisit some of the tools and exercises mentioned earlier, such as the exercises on decision making, establishing roles and responsibilities and ideas evaluation, to resolve the conflict. Conflicts identified early and addressed with the first approach often led to amicable resolution between students.

    The second approach requires a teaching staff to act as a mediator. Student groups will have to surface the conflict to the lecturing team who will facilitate the conflict management discussions.

5.7 Post Collaboration

Following are the descriptions of the Post Collaboration tools and exercises:

21. *Performing self- and peer-assessments*
Assessments on the team's collaborative efforts were conducted during the conclusion of team projects. Students were able to provide feedback for each team member's performance. An assessment matrix was used that took into account five areas: Communication, Participation, Work Load, Dependability and Adaptability. Self-assessments also encourage students to reflect on their own contributions to the team and in turn assess their peers in a more constructive fashion.
22. *Reflecting on teamwork experience*
Students were required to discuss their shared journey with their

peers at the end of the project. This is also an opportunity for them to revisit the agreed list of key characteristics of effective teams and use it as a guide to reflect on their experiences and assess whether they have achieved them as a team.

23. *Reviewing journals*
Students had to update their journals to note key lessons learnt and challenges faced during the teamworking process. The journals were submitted to the lecturing team for review. These journals have the added benefit of allowing lecturers to review the results of the tools introduced and to note any teamwork issues that may not have been addressed by the teamwork workshops.

6. Lessons Learned and Recommendations

A number of insights were uncovered with respect to the teaching of teamwork. Observations from lecturers indicate that students encountered lesser teamworking issues with the introduction of teamwork workshops. The timely introduction of relevant skills according to the various stages of the design process helped students overcome difficulties more effectively. The teaching of teamworking skills is believed to have more strategic long-term benefits as opposed to the short-sighted goal of simply producing interdisciplinary outcomes. Students equipped with teamworking tools are better placed to tackle future group projects and assignments successfully. This can also have a positive impact on their willingness and enthusiasm for future collaborations.

However, other factors such as the strength of the cohort, size of the teams and requirements of the brief could have been possible contributing factors to the success of the projects. The teaching of teamwork skills will require an extensive period of iterative improvement. The post-mortem discussions with the lecturing team uncovered areas of improvements and the following key questions raised may guide further discussions and explorations:

- What can be learned and adopted from successful design teams in the industry?
- How can the teaching of teamwork skills be centralised across all programmes in the Faculty?

- How can the number of opportunities for the practical application of teamwork skills be increased, e.g. by introducing teamwork skills in the first year of the programmes?
- How can students' incremental development of teamwork skills across the years of study be assessed effectively?

Although the tools discussed in this paper are categorised in alignment with d.School's design thinking methodology, it can be adapted by curriculum managers for any team design process. The tools and exercises are of value to any form of teamwork but even more so for interdisciplinary collaborations. Interdisciplinary projects require the contribution and cooperation of all team members to succeed. Educators cannot assume that simply putting students in teams will result in the development of teamwork skills. In order for students who have little prior teamworking experience to come together from various domain-specific trainings in an interdisciplinary project, the teaching of teamworking skills is crucial as it forms the foundation for team collaboration and success.

Stanley Lim
Lecturer, Design Communication,
Faculty of Design,
Lasalle College of the Arts, Singapore
stanley.lim@lasalle.edu.sg

Joselyn Sim
Lecturer, Faculty of Design,
Lasalle College of the Arts, Singapore
joselyn.sim@lasalle.edu.sg

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Highly Potential / Highly Problematic

Participatory Design Processes with Children with Autism

Sevi Merter

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Abstract

Children with autism have limited interaction and communication skills and participatory design allows designers to elicit direct information about children with autism and understand their life-worlds, strengths, and limitations more deeply in a design process. In participatory design, the aim is not always searching for situated, creative, and tangible design solutions towards problems, but also empowering participants through design by helping them develop awareness of themselves and the conditions, situations, systems, relationships etc. that they are in. Participants' active participation also allows designing more appropriate physical and social environments for these individuals. However, due to the sensitive conditions of children with autism and the emotional sensitivity of their parents and special educators, some problems, such as conflicting values or views, may occur during participatory design processes with them. This paper presents some initial findings on the interaction and communication issues realized during the exploratory stage of a case study as a part of an equipment design project for sensory development of children with autism. These findings are discussed in terms of (1) the participants' skills and ways of interaction and communication that are directly related to the design process and (2) the level of interaction and communication among themselves that are directly or indirectly related to the design process.

Theme: Conflicts
Keywords: participatory design, product design, children with autism, interaction and communication

1. Introduction

Participatory design is a powerful way of interacting and communicating with children with autism through human-centered and process-oriented research. It focuses on empowering participants, especially who are excluded in the society, through participatory and emancipatory practices, either directly or through representatives, for exploring and identifying presumably positive future possibilities (Muller et al., 1991; Sanoff, 2000; Sanders & Stappers, 2008; Simonsen & Hertzum, 2010; Greenbaum & Loi, 2012). The exploration of these future possibilities are only possible through understanding the life-world of the potential user (Frauenberger,

Good, Fitzpatrick, & Iversen, 2015). It does not only provide design input, but reveals the deficiencies to be tackled for enhancement in their lives as well.

Participatory design allows designers to elicit direct information about children with autism and understand their strengths and limitations more deeply. However, due to the sensitive conditions of these children and their caregivers, some problems may occur during the participatory design processes with them, such as conflicting values or views. Participatory design acknowledges such conflicts and dilemmas as an opening for expansive and creative transitions going beyond situated solutions (Gregory, 2003; Frauenberger et al., 2015).

Participatory processes are contextual and the type, level, and frequency of the participation of individuals, as well as the profile of participants, may vary depending on the context (Sanoff, 2000). Participation in the design process is also important for developing more suitable designs in relation to the physical and cognitive needs and conditions of participants (Maguire, 2001; Olsson, 2004; Muller & Druin, 2012). There are several design projects conducted with the participation of children with autism (Pares et al., 2005; Piper, Brien, Morris, & Winogard, 2006; Van Rijn & Stappers, 2008; Hirano et al., 2010; Frauenberger, Good, & Keay-Bright, 2011; Millen, Cobb, & Patel, 2011; Benton, Johnson, Brosnan, Ashwin, & Grawemeyer, 2012; Malinverni, Mora Guiard, Padillo, Hervas, & Pares, 2014; Malinverni, Mora-Guiard, & Pares, 2016; Merter & Hasırcı, 2016; Mora-Guiard, Crowell, and Pares 2016). Within this perspective and in the light of these studies, a case study is planned to be conducted with children with autism, their parents, and special educators at a public special education school in Izmir, Turkey, as a part of a design project. The project is designing an equipment for the sensory development of children with autism, who have impaired sensory systems. The exploratory stage of the case study, which aims to develop a comprehensive understanding of the conditions, needs, abilities, and capabilities of the children with autism with various sensory impairments, is covered within the scope of this paper. It presents some findings and realizations concerning the interaction and communication issues in a participatory design process with children with autism and how participation reveals various sorts of information.

2. Interaction and Communication in Participatory Design Processes with Children with Autism

Participatory design is not a collection of design methods, but has a human dimension and is a social process revealing tacit knowledge through exchanging of information; however, the lack of a common language for design dialogue can be challenging in some situations, even though it enables user knowledge to be transformed into design input (Luck, 2003). It is even more difficult when participants have impaired interaction andcommunication skills. Establishing a well-supported dialogue and a healthy and trustful relationship is also important in order to ensure the negotiation of different interpretations, and values of all participants with different skills, abilities, needs, and views, since individual experiences are subjective and participatory design aims to co-create contextual knowledge and shared values (Iversen, Halskov, & Leong, 2012; Frauenberger et al., 2015; Kang, Choo, & Watters, 2015).

The limitations in participatory design processes with children with autism and their caregivers, regarding interaction and communication issues, are mostly rooted in the sensitive condition of the children. The characteristics of children with autism, such as verbal communication deficits, lack of interest in establishing social relationships, lack of understanding social cues through non-verbal signs, frustration in unpredictable situations out of their routines and with unfamiliar people (Tager-Flusberg, 1999; Mesibov, Shea, & Adams, 2002; Howlin, 2004; Bogdashina, 2006; Farrell, 2006; NIMH 2014), cause parents and special educators to be sceptical about the intervention of people, who are not trained or experienced in dealing with autism, such as designers. However, active participation of those individuals and eliciting direct information from their lives are of great importance to develop more appropriate design solutions. In that sense, participatory design provides a generative ground for different ways of knowing for designers, who are not always necessarily experienced in or knowledgeable with working with individuals with special conditions (Frauenberger et al., 2015). During the intervention of designers in the lives of children with autism, the participation of people, who these children are familiar with, is critically important, since they cannot express themselves through socially accepted ways of communication due to their limited interaction and communication skills. Within this perspective, it is important to establish trustful relationships first with the parents of children with autism to make them feel secure and willing to support such studies by showing that their views and experi-

ences are valuable, the process is transparent, their children will not be harmed, and all participants have equal ownership over the process and its outcomes. They should also be assured that ultimate attention and sensitivity will be shown throughout the process.

Direct participation of children with autism comes with challenges caused by the disorder, such as lack of communication, interaction, and conceptual thinking skills required for collaboration and idea generation, which affects the design process (Woodcock & Woolner, 2007; Benton, Johnson, Brosnan, Ashwin, & Grawemeyer, 2011; Hendriks, Slegers, & Duysburgh, 2015). Moreover, unfamiliar situations can cause anxiety and frustration. Therefore, direct knowledge elicitation methods, brainstorming, interviewing, sketching, and low-tech prototyping etc., which require verbal, visual and/or hands-on activities, may be less appropriate and effective (Keay-Bright, 2007; Hendriks et al., 2015). This challenge requires tailoring the methods and tools to the varying conditions and abilities of children (Van Rijn & Stappers, 2008; Millen et al., 2011; Frauenberger, Good, & Alcorn, 2012; Hendriks et al., 2015). Keay-Bright (2007) states that neither quantitative nor qualitative data can be gathered systematically when working with children with autism. Therefore, it is important to gather those data through a flexible method, focusing on physical activities, verbal expressions, or gestures (Frauenberger et al., 2012; Merter & Hasırcı, 2016).

Within this perspective, it is intended to discuss some critical issues realized in the initial stage of a participatory design project with children with autism in this paper.

3. Some Critical Interaction and Communication Issues in a Participatory Design Process with Children with Autism

The project described in this paper is in its initial stages and will be proposed as a scientific research project supported by Higher Education Institutions. The aim of the project is to design an equipment for the sensory development of children with autism, who have impaired sensory systems causing inadequate perception of and deficits in developing appropriate responses to the outside world (Bogdashina, 2003; Tsatsanis, 2005; Yıldırım Doğru, 2009; Foss-Feig, Heacock, & Cascio, 2011; Ashburner, Rodger, Ziviani, & Hinder, 2014). For the realization of the project, a case study is planned to be conducted with children with autism, their

parents, and special educators at a public special education school in Izmir, Turkey. With the consent of their parents, five children with autism are participating in the study with their parents and special educators. In this paper, the exploratory stage, concerning the problem identification and developing a comprehensive understanding of the conditions, needs, abilities, and capabilities of the participant children, is discussed with a focus on some initial findings on the interaction and communication issues realized during the process.

With the aim of developing familiarity with the children and the school, including the settings and the people, subsequent visits were made to the school. Following an informative meeting with the parents of children registered to the school, five parents volunteered to participate in the project and gave consent for the participation of their children with various sensory impairments, hypersensitivity and hyposensitivity, with different levels of severity and between the ages of 5 and 11. Therefore, the participants, including the parents and special educators, are very heterogeneous in terms of their abilities and expected levels of participation. The duration of the exploratory stage of the case study was four days and the main focus was on understanding the participant children's conditions and needs as well as exchanging experiences and insights among the participants. Since direct elicitation methods are not appropriate to be used with children with autism due to their physical and cognitive conditions, observations and informal conversations were conducted to collect data and collaborative meetings were held both to collect and evaluate data. The data was recorded in writing and through photographs and videos.

The findings revealed that despite the satisfaction of the participants at the end of the exploratory stage of the study, some problems were encountered in relation to the interaction and communication among the participants. These problems sometimes required great effort to overcome and manage the process, since facing with those problems was challenging for some participants in some situations. It was a valuable input for the study to identify such problems and to experience the ways of managing the process under such special conditions in a participatory design process. The interaction and communication issues are discussed below regarding (1) the participants' skills and ways of interaction and communication that are directly related to the design process and (2) their levels of interaction and communication among themselves that are directly or indirectly related to the design process.

As is the case for all children with autism, the interaction and communication of the participant children were problematic due to the nature of the disorder. This created anxiety and distraction for all participants at first. Especially the parents and special educators were very sensitive, distrustful, and skeptical towards the study at the beginning. Therefore, it was very important to respect their sensitivity and doubts and take action accordingly. They believed that designers were ignorant in terms of working with children with autism and were anxious about the designer's involvement. However, a healthy dialogue with these participants were possible to a certain extent through informal conversations, aiming to convey the perspectives of designers on the issue and the potential of their participation in increasing the well-being of their children through design. As trust was started to be built, the interaction increased and the parents and special educators started to engage in more sincere conversations as well as feeling more comfortable to share information, make sudden and further explanations, give personal details, and offer and provide help to the designer.

Two parents were very dominant and they showed exceptional interest and enthusiasm to participate and persuaded others to do so as well. It was later realized that they were more educated and knowledgeable about autism compared to the other parents, well-respected by the others, and more aware of the potential of design in increasing well-being. Their willingness was a motivating and driving force for the others to volunteer. In that sense, the communication among the parents affected the initial stage of the study positively and the volunteered engagement of some participant parents also increased during the process. This was observed to be caused by the confidence and comfort they built throughout the process due to the support they received from each other and starting to realize how valuable their ideas, experiences, knowledge, and contributions were for the designer. The special educators, on the other hand, did not hesitate to participate, after the parents volunteered and gave consent for the participation of their children. However, one of them was very distracted during the designer's presence in class activities and felt the need for engaging in continuous dialogue with the designer during the observations instead of focusing on the children at first. The designer comforted her, explained the purpose of her presence, which was to observe the class activities objectively, and encouraged her to act as usual in the class. This help the participant to overcome her distraction later on.

The participant children were mostly frustrated due to the designer's presence at first. Thus, the designer's intervention increased gradually. It helped the children get familiar with the designer, often with the special educators' guidance and parents' intervention when needed to control unexpected situations. Even though the designer was previously informed about and did research on children with autism, it still took some time to get used to the unpredictability of children's behaviours, be patient as they spent time together, and ask for immediate guidance and help from the parents and/or special educators when needed. Even though the designer's presence was an uncomfortable and undesired experience for the children at the beginning, their frustration decreased apparently towards the end of the process. The overall interaction of the participant children with the designer was more than it was expected and even beyond the expectations of the parents and special educators. The children started to be less distracted and more engaged during their activities in the designer's presence as time passed.

Since the participant children had severe conditions, none of them had direct creative contributions during the study. Some of them showed no interest at all as expected. However, observing the children during their activities and conversations with the parents and special educators were quite helpful for having a deeper understanding of the children and certain situations. In that sense, the guidance and support from the participants were also important to make sense of some observed activities, behaviours, and situations and to learn how to behave in some occurrences.

It was important to identify and incorporate especially the children's characteristics, including their strengths, capabilities, preferences, physical and social needs, disturbances, and fears, either known or unrealized until that time, in order to analyse and benefit from them as design inputs. In that sense, spontaneous collaborative meetings were one of the most effective instances of the study. They were helpful for exchanging personal experiences among the participants. In some situations, certain cases were discussed collectively, which was quite valuable for clarifying what and why they happened and how to cope with such cases or for utilizing them as design input. Moreover, the spontaneity of these meetings provided flexibility and adaptability in the process, which depended on the spontaneous changes and occurrences caused by the children's conditions. The participants felt free to take part in these meeting, which provided them a sense of freedom, and they were often willing to participate.

At the end of the study, all participant parents and special educators stated their satisfaction. They stated their expectations for more tangible outcomes to be directly applied at the school in the collaborative meetings. Towards the end of the study, it was apparent that the parents and special educators were more confident in engaging in conversations related to the study. The designer was intentionally careful about not being involved in the discussions that require medical knowledge. However, a great effort was shown in making explanations on the importance of such participatory processes for having a deeper understanding of children with autism and creating more appropriate and inclusive environments for them to ease their lives and improve their well-being. It was observed that the support from some participants affected the others positively as well.

However, some critical issues regarding the inadequacy of communication in general were identified during the study as well. When evaluating the collected data and information elicited during the process, a serious inadequacy in the communication between the parents and special educators was realized. Firstly, and most importantly, the information about the children received from the special educators was often inconsistent with the information received from the parents. For some children, there was even no previous exchange of information about the child between the parent and the special educator. The second realization was that the special educators at the school were not specifically trained in special education of children with autism, which could be observed in the way they communicated and interacted with the children, disregarding some common considerations of communicating with them. Lastly, most of the participant parents were not quite aware of the severity of their children's disorder and trained about the intervention methods. They lacked the knowledge of taking care of their children appropriately. It was observed that the special educators did not show sufficient effort to inform the parents and found it adequate to point out the parents' low educational levels as the reason of their lack of knowledge. For instance, some of them did not even know that there is no cure for the autism and shared their hopes for this study to heal their children. These realizations and managing these situations were challenging for the designer and required serious sensitivity, care, and attention to behave in a way to look after the benefits and interests of the children first. As a constructive criticism, these findings were shared with the participants, aiming to contribute to the enhancement of relationships between

the parties affected by the autism and identify what was needed. However, the participants were disturbed and uncomfortable to hear the deficiencies in their relationships and reacted negatively. It required serious effort, support, and intervention of certain participants to explain that those realizations had to be seen as a potential for improvement rather than a thread.

3. Conclusion

A participatory process contributes both to design and, most importantly, the participants' lives. In the study presented in this paper, it was focused on the participants' skills and ways of interaction and communication that are directly related to the design process and their levels of interaction and communication among themselves that are directly or indirectly related to the design process that are directly or indirectly related to the design process. Firstly, it is important to learn and develop strategies to cope with unexpected situations as they are realized in participatory processes especially with individuals with special conditions and other affected people in their surroundings. Healthy and trustful relationships among the participants are of great importance in order to achieve this.

However, not all realizations and findings are always pleasing. As presented, the aim is not always searching for situated, creative tangible design solutions towards certain problems, but also empowering participants by helping them develop awareness of themselves and the conditions, situations, systems, relationships etc. that they are in with design. Even though the transparency of processes is desired in participatory design, it may cause some difficulties for participants, who are directly affected by those situations, to accept, face with, and embrace some critical issues. However, these are some potential areas, where participatory design can contribute with fruitful and beneficial outcomes in social relationships, and they require serious consideration. It is also another aspect of empowerment and requires trustful bonds among the participants to discuss such issues and negotiate for the best for all. Within the scope of this study, the benefits and interests of the children with autism are the priority.

In the following stages of the case study within the aforementioned design project, it is aimed to develop strategies to manage similar problems that may be encountered in the future. Since it is very essential to establish trustful relationships, it is assumed that it will create a positive

effect on and perception of the participants to show that their views and insights are valued and incorporated and that the stated problems are taken seriously with the aim of searching for solutions collectively. This may increase their trust, motivation, and also their levels of participation during the rest of the study. As a result of all these, both successful products meeting the needs of the children with autism can be provided and a more healthy environment, in terms of physical and social aspects, can be provided to them with the contribution of empowered individuals. This can also be considered as a sustainable social outcome of participatory design processes with children with autism.

Sevi Merter
Lecturer Department of Industrial Design,
Faculty of Art and Design, Yaşar University, Turkey
sevi.merter@yasar.edu.tr

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Consensus Decision-making in Designbuild projects

Barak Pelman

Abstract

This paper describes a Consensus Decision-Making process (CDM), which was recently practiced by a group of third year architecture students. The process was applied in order to choose between design proposals for a temporary bamboo pavilion to be collaboratively built by the students. This was part of a 6-week Designbuild studio course, held in summer 2017, at the Architecture Department of Bezalel Academy of Arts and Design in Jerusalem, Israel. The course itself focused on the process of actual building and experimenting with materials, as an important driving force of architectural design.

During the course, the students developed 6 design proposals, out of which they had to choose one to construct collaboratively. CDM process was used in order to facilitate the selection process, by structuring a dialectical interaction that enables the student to work through conflicting ideas, while maintaining affective relationships. The process facilitated a deep engagement by all students in the design development and construction phases, while enriching their learning experience.

Theme: Conflicts
Keywords: consensus decision making, design-build, architecture education

1. Introduction – Designbuild education

> "Artist, let us at last break down the wall erected by our deforming academic training between the 'arts' and all of us become builders again! Let us together will, think out and create the new idea of architecture". (Gropius, 1970)

Designbuild is a pedagogical model synthesizing together the action design and the action build.[1] It is based on the belief that the learning process of designers and architects is significantly enhanced through "hands-on" engagement with the realization of full-scale prototype struc-

1 To be distinguished from the "Design-Build" professional service delivery model in the construction industry

tures, through which they can test spatial ideas and attain a deeper phenomenal understanding of their design.

The development of Designbuild pedagogy can be seen as a reaction to the disengagement of architects from their master-builder roots[2]. Reading the famous roman architect and engineer Marcus Vitruvius's description of the architect's education from around the 1st century BC, we can appreciate the importance of both theory and practice in the training of an architect:

> "The architect should be equipped with knowledge of many branches [...] This knowledge is the child of practice and theory. Practice is the continuous and regular exercise of employment where manual work is done with any necessary material [...] Theory, on the other hand, is the ability to demonstrate and explain the production of dexterity on the principle of proportion". (Vitruvius, 1914, p. 5)

This perception continued through medieval times when architect's trainees became journeymen by experimentation with materials and different crafts, and working on various building sites (Carpenter, 1997). However, at the end of the medieval period architects' education started to focus more on theory, leaving the practical knowledge to others. As Leon Battista Alberti wrote nearly 1450 years after Vitruvius in his famous book On the Art of Building in Ten Books: "the carpenter is but an instrument in the hands of the architect". (Alberti, 1988, p. 3)

This separation between theory and practice, continued during the Enlightenment and the Industrial Revolution, and can be identified also among contemporary architectural theorists, who have reinforced the idea that "architecture, as opposed to 'mere' building, is exclusively an intellectual endeavour, a form of knowledge, autonomous from the realm of builderly concerns".(Kraus, Hands on, Minds on, 2017, pp. 4,5)

Designbuild pedagogy rose against this trend. Its approach tends to be closely allied with Phenomenology and American Pragmatism.(Ihde, 2009) As Pragmatism defines itself as a theory of practice, it tends to resonate with Designbuild educators in their way of thinking, that might be best framed in the context of phronesis – practical wisdom and mindfulness. (Kraus, Hands on, Minds on, 2017, p. 7)

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2 Etymologically, the word "Architect" derives from the Greek: Arkhi – 'master' and 'takton' – builder

Designbuild programs in architectural education usually go beyond the scope of hands-on craftsmanship, as they provide opportunities to include such aspects of the discipline which relate to the "real world" of construction such as: budgeting, fabrication processes and the means and methods of construction – issues that are usually marginalized in the conventional design studio. (Kraus, Architecture into Presence, 2017, p. 93)

Another pertinent feature of Designbuild programs is their collaborative nature. Given the complexity of synthesizing all the aspects of design and construction within a limited time frame, it is rooted in team work. In many cases, groups of students need to negotiate and synthesize ideas, overcoming conflicts and preserving good relationships. In the process, Designbuild programs provide an opportunity for associationalism[3] where, by constructing a building, a community of learners is also created.

2. Background: Consensus Decision Making (CDM)

> "Consensus is a creative thinking process: When we vote, we decide between two alternatives. With consensus, we take an issue, hear the range of enthusiasm, ideas and concerns about it, and synthesize a proposal that best serves everybody's vision."[4]

2.1 Group decision-making

When a group of people (in this case students and faculty) gather together in order to decide on an important issue relating to their common project, there needs to be a number of conditions in order for the decision to provide high value to all or most participants. Amason (1996), identifies four such conditions:1) group cognitive capability; 2) the interaction process of the members; 3) consensus and 4) affective acceptance.

The decision quality is related to the cognitive capabilities of the group members, as well as to the process through which the group produces its decisions. Group cognitive capability is related to its cognitive diversity, which provides a variety of skills, experiences, knowledge and

3 The tendency to construct community around shared, even urgent, need. (Bowne, 2017)

4 A primer on the NYC General Assembly website, the structural expression of the Occupy movement, as quoted by (Kauffman, 2015)

perspectives upon which a team can draw when making complex decisions. However, equally important is the interaction process the members use to produce decisions. Effectively utilizing a group's capability involves identifying and synthesizing those skills and perspectives of its members which are most appropriate for each decision (Schweiger & Sandberg, 1989). Research has shown that dialectical interaction techniques which encourage critical and investigative interaction, promote this process and provide a means to synthesize conflicting alternatives into a single decision (Schweiger D. M., 1986) (Schwenk C. R., 1990) (Schwenk C. R., 1980).

In order to process positive dialectical interactions that enable a synthesis of conflicting alternatives, there is a need to maintain affective relationships. Team members with strong negative sentiments towards one another, or towards the team in general, are less likely to fully participate in the decision-making process and therefore hinder its effectiveness. And lastly, to effectively implement a decision, there is a need for consensus among team members since it requires their active cooperation. (Amason, 1996).

Indeed, groups working to achieve these conditions will probably confront conflicts in the process. Amason distinguishes two kinds of conflicts:

Cognitive Conflict – which is focused on judgmental differences about how best to achieve common objectives. Cognitive conflicts contribute to decision quality, because the synthesis that emerges from the contesting of diverse perspectives is generally superior to the individual perspectives themselves. (Amason, 1996)

Affective conflict – which tends to be emotional and focuses on the personal incompatibilities of individuals in disputes. Affective conflict seems to emerge when cognitive disagreement is perceived as personal criticism. It can foster cynicism, avoidance, or countereffort, that could undermine consensus and affective acceptance, and jeopardize decision quality.(Amason, 1996)

2.2 Models of Consensus Decision-Making

The origin of the Latin word Consensus (agreement) is Consentio which combines Com, meaning 'with' or 'together', and the word Sentire (Merriam-Webster dictionary, 2018). Sentire has several meanings: to feel, to experience, to think, to realise, to see and to understand. (Latin Dic-

tionary, 2018) so the word Consensus means both the agreement itself as well as the process of reaching it by thinking, feeling, and understanding together.

In order to explore the different variations of consensus decision-making methods, it is useful to distinguish between consensus as a process and consensus as its result.

Consensus as a result – The level of agreement necessary to finalize a decision is known as a decision rule. Consensus is perceived as a range at the end of the spectrum of decision roles. This spectrum can be express in the following:

- Unanimous agreement
- Unanimous agreement minus one vote or two votes
- Condorcet consensus
- Consensus voting
- Super majority thresholds (90%, 80%, 75%, two-thirds, and 60% are common).
- Simple majority (above 51%)
- Executive committee decides
- Person-in-charge decides

Consensus as a process – This is a form of group decision-making which is based on the conditions for high-performance decisions that were described above. Unlike voting-based methods, which are a means by which voters choose one alternative from several, Consensus processes are a means by which group members work together to refine the plan until everyone finds it acceptable.

There are multiple stepwise models of how to make decisions by consensus. They vary in the amount of detail the steps described. They also vary depending on how decisions are finalized, since the process can be combined with any decision role. As the field of group facilitation has evolved, more detailed models of consensus decision-making have been developed. Some focus on the process of group collaboration, others on increasing understanding within the field of how collaboration can best be fostered and what facilitation techniques can promote it. The basic model for a consensus process involves the following 6 steps (Hartnett, 2018):

1. Discussion
2. Identify emerging proposals
3. Identify any unsatisfied concerns
4. Collaboratively modify the proposal
5. Assess the degree of support
6. Finalize the decision OR circle back to step 1 or 3.

2.3 When to use Consensus Decision-Making?

In his study of the history of CDM within activist movements, Kauffman (2015) concludes that CDM has several weaknesses: 1) It is time consuming and discussions tend to focus on minor issues. This could raise questions about its effectiveness especially in large groups. 2) It is highly sensitive to those acting in bad faith. These can bring the process to halt. 3) It is ill-equipped to deal with affective conflicts and the "real world" of rough-and-tumble political negotiations.

Therefore, many researchers conclude that the process often works well in small groups of motivated and committed individuals with high a degree of affinity and a common goal. (Kauffman, 2015) In addition, due to its complex structure and time-consuming nature, only decisions on issues of high importance and strategic character should be considered for the process.

3. Course outline

In order to understand the use of CDM in this course, we need first to briefly describe its general outline. The course was a 6-week Designbuild studio course, held in summer 2017, at the Architecture Department of Bezalel Academy of Arts and Design in Jerusalem, Israel. The course focused on the process of actual building and experimenting with materials as an important driving force of architectural design. The task was to build a full-size entrance pavilion to the Department of Architecture using natural bamboo poles.

The course was developed through four stages: 1) capacity building 2) design proposals 3) design development and 4) fabrication and assembly. In all stages, students worked in groups of 3–4, however the composition of the groups changed many times throughout the course. All students were asked to write, individually, a final report that described their personal learning path as well as to fill in a questionnaire about different

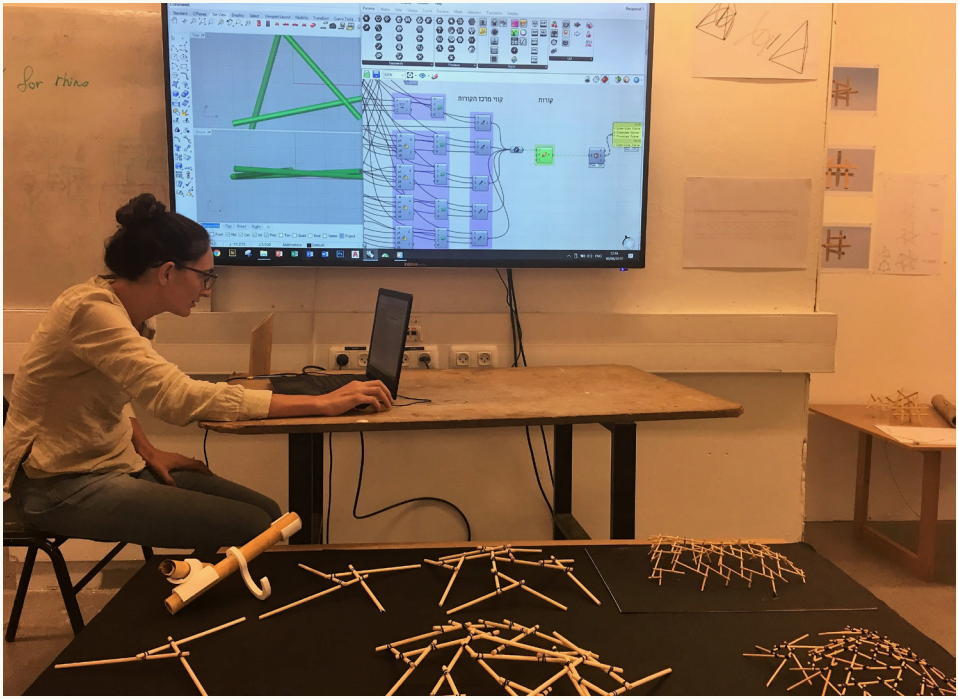


Figure 1. A group member presents their work on stage 1. Structural systems were tested with models and coded with GrassHopper software. 3D printings were tested for bamboo joints. Image: Barak Pelman

aspects of the course. Both would serve afterwards to evaluate the CDM process.

Capacity Building (1 week) – At this stage, students were asked to investigate predefined structural systems and develop bamboo joints to address their structural nature. Investigation of the structural systems was done by codifying their characteristics into 'GrassHopper' software, while the development of bamboo joints was done on real bamboo samples. Students achieved knowledge and skills in 3D scanning and printing, bamboo properties, structural systems and GrassHopper coding.

Design Proposals (1.5 weeks) – Six groups of students were asked to develop their proposals for an entrance bamboo pavilion. The design brief asked for a meeting place and a passage, which would offer a special sensorial experience and microclimate. Students were asked to address the site's special characteristics, structural and budget considerations, bamboo properties and characteristics, as well as fabrication and assembly strategies.

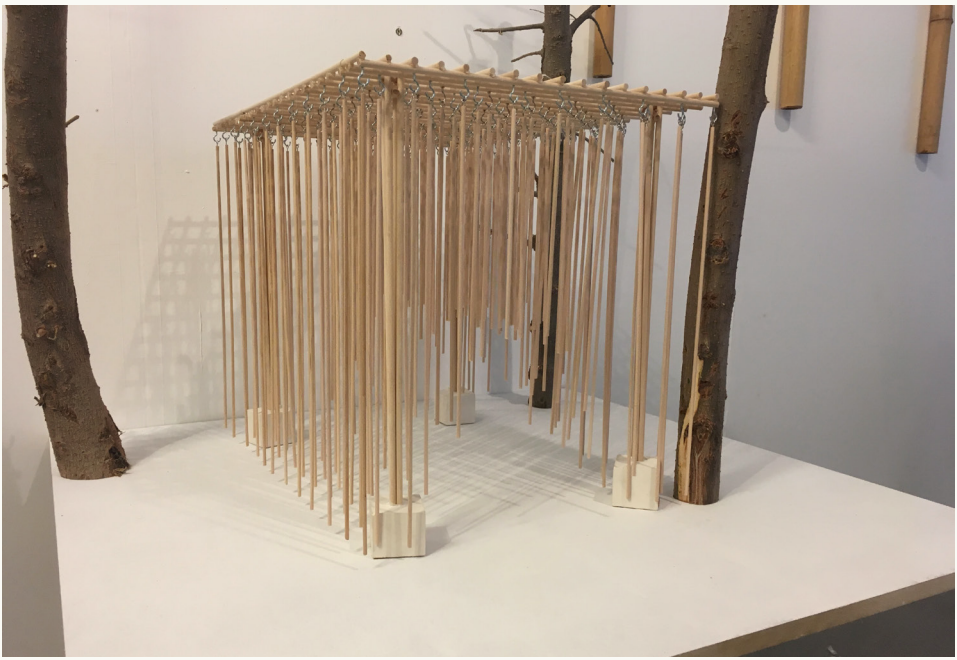


Figure 2. The "winning" design proposal in a 1:10 model. Image: Barak Pelman

The groups presented their designs at a special event where external guests were invited to give feedback on the different aspects of the proposals. Comments, insights and ideas were registered and became the starting point of the CDM process, which followed immediately in order to identify one design proposal to be the starting point for the next design development stage (see chapter 5 for an elaborate description).

The "winning" design proposal was called "The Bamboo Forest" and comprised a bamboo grid placed 6m above the ground and about 100 bamboo poles of different lengths, hanging from the intersections of the grid. The whole structure was designed to be placed on 4 columns.

Design Development (1.5 week) – The CDM process also produced a list of comments and concerns about the chosen design. At the Design Development stage, we allowed time to address this list by composing a new design brief and arranging new working groups to allow students to work on the aspects of the design which related to their concerns, skills and interest.

Fabrication and assembly (2 weeks) – This stage started simultaneously with the previous stage, as some groups started to fabricate their elements earlier than others. At the same time, development of the de-

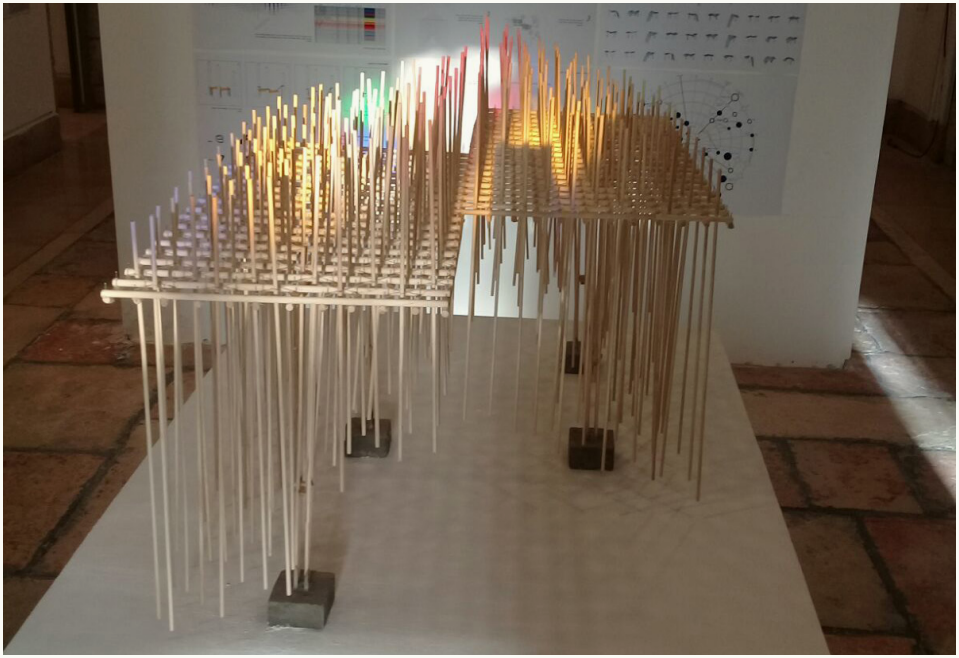


Figure 3. The final design after design development stage. Image: Sara Cohen

sign never really stopped. Fabricating, assembly and redesigning were done in cycles, when in each iteration the design was improved by the lessons derived from the previous trial.

The final design was somewhat different from the initial one since it incorporated changes from the new design brief (see fig. 3): for example, the upper grid was divided into two segments and lowered to 3.5 m' above ground level. The number of hanging bamboo poles was doubled and they moved to a new location, and their joints were adjusted accordingly. In addition 3D printed joints as structural solutions were developed.

5. CDM process in the course

Since the construction of the Bamboo Pavilion required full collaboration and engagement of all students in the course, a consensus on the design proposal had to be achieved. Therefore, CDM process was applied at the end of the Design Proposal stage, when a single proposal was to be selected to be collaboratively modified and constructed. The process was based on the general CDM model, while applying some necessary modifications required to meet the special characteristics of the course.

The process involved the following 8 steps:

5.1 A discussion including external reviewers

The participants were: all students and tutors of the course, the Bamboo contractor and supplier, one architect and one industrial designer, as well as the department workshop master, who was responsible for safety requirements. The discussion was structured around the design proposals which were presented by each group to the audience. During discussion, the students were asked to write down their insights and thoughts to be used for the next steps.

5.2 Developing evaluation criteria

After the first stage, all external reviewers were asked to leave, and the groups sat to develop a set of evaluation criteria to support the evaluation process. This process was conducted as a free discussion with the tutors acting as facilitators. The first decision was on the "Decision rule," which was set at "Unanimous agreement minus 2".

At the end of this stage, the evaluation criteria included criteria from the initial design brief and addressed the students' areas of interest and concerns.

The final list of criteria was:

The overall quality of the space / pavilion – A general evaluation of the overall quality of the proposal. It reflects the coherence of the different parts of the proposed design as well as its ability to convey a strong spatial / sensorial experience.

The way the design addresses the site characteristics – the way the proposed pavilion addressed the nature of the site: its atmosphere, materiality, layout and geometry, as well as the way people move and circulate within it.

The extent of interest that the project evokes – the relevance of the proposal to current issues within the theoretical and technical background of the course.

The potential for innovation – the potential to develop innovative design solutions that are relevant to the construction industry.

Further development potential – it was important for the students to understand if, and to what extent, they can still influence the development of the project. Therefore, projects that could offer opportunities for

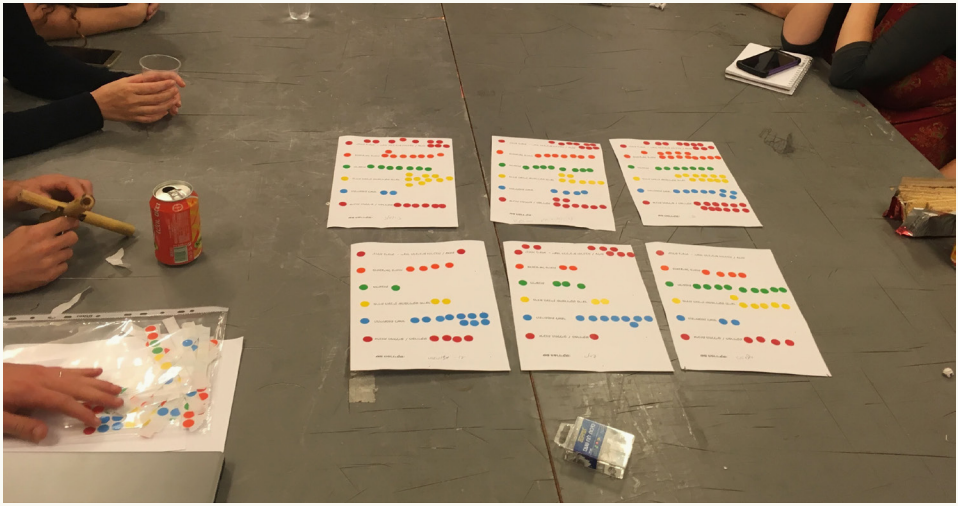


Figure 4. The outcome of the evaluation stage:
Six coloured evaluation sheets. Image: Barak Pelman

further development of different aspects – such as joints, assembly strategy or overall design improvements gained a higher score.

Building capacity – the financial and technical resources to realize the project.

5.3 First evaluation

After agreeing on the Decision Rule, and the criteria of evaluation, the students and tutors evaluated the proposals, using a version of "Dot Voting" method[5]. Coloured dot-stickers were placed on the evaluation sheets which included the evaluation criteria (see figure 4). The outcome of this process was a set of six coloured evaluation sheets that offered an instant visual picture of the strengths and weaknesses of each proposal as evaluated by the members of the course.

5.4 First vote – Identifying Emerging Proposals

Having completed the first evaluation stage, the members were ready for the first vote, which aimed at identifying emerging proposals in the form

5 Dot Voting is an established facilitation method used to describe voting with dot stickers or marks with a marker pen.

of a shortlist (two projects). Therefore, each member was asked to choose two proposals, without letting other members of the team know what they had chosen. The voting result shows that one proposal was clearly more favoured than the others, however, two other proposals were also strong and very close in number of votes. Therefore, we decided to stretch the shortlist slightly and to include three projects instead of just two.

5.5 Identifying concerns

This stage was devoted to a free discussion, where members were encouraged to express their concerns about one or more of the proposals in the shortlist, and think about the different ways their concerns could be addressed at the design development stage.

For example, some students were concerned about the way the geometry of one proposal related to the layout of the site, and whether it would be possible to change it without losing its other qualities. Others were concerned about the over simplicity of the joint technology, and whether it would be possible to develop a better one. Another concern was related to the availability of computation capacity needed for solving the geometry, and another was related to our ability to lift and fix a bamboo grid at a height of 6m'.

5.6 Laying the foundation of a new design brief that addresses these concerns

The list of concerns and their possible solutions became the foundation of a new design brief. It gave the students a sense of the kind of work that would be needed in order to develop the chosen design, and whether they would like to be engaged in this work. Thus, the evaluation of the projects turned from the set of evaluation criteria (developed earlier) to the capacity of each of the design proposals to be developed in a way that fulfills one's concerns and the option for this person to be involved in this process.

5.7 Second vote – Assessing the degree of support

After the discussion about concerns and possible development trajectories came to a conclusion, the team was ready for the second vote. In this vote, all course members were asked to choose one proposal only – the one they would like to be constructed. This vote was also conducted in a

discrete way. The result of the vote showed, again, one favorite design, however there were still four students who were not happy about it.

5.8 Circling back to step 5.6 or Finalizing the Decision

Since consensus was not achieved at his stage, there was a need to return to stage 5.6, and discuss the different concerns and their possible solutions, and adjust the design brief of the design development stage so that it would better address the new concerns. After we felt that the discussion was exhausted we were ready again for a new vote, which ended with a full consensus.

To sum up, Table 1 describes the differences made in the CDM process in the course by comparing it to the general CDM stages described in chapter 2.

CDM general stages (Hartnett, 2018)	CDM in Designbuild studio
1 Discussion	1 Discussion including external reviewers
	2 Develop evaluation criteria
	3 First evaluation
2 Identify emerging proposals	4 First vote – to identify emerging proposals
3 Identify any unsatisfied concerns	5 Identify concerns
4 Collaboratively modify the proposal	6 Lay the foundation of new design briefs that address these concerns
5 Assess the degree of support	7 Second vote – assess the degree of support
6 Finalize the decision OR circle back to step 1 or 3.	8 Circle back to step 5.6 or finalize the decision

Table 1

It can be seen that we divided the first discussion stage into 3 parts: The first discussion was conceived as a consultancy meeting where external reviewers were expected to raise new considerations, information and predictions to inform the development of evaluation criteria and the first evaluation stage. The following stages were similar in nature to the general CDM model, only that instead of modifying the design proposal directly – an impossible task to do in this setting – we collected the concerns and their possible solutions and laid the foundation for the development of a new design brief, which was addressed at the design development stage.

6. Discussion

The evaluation of the course was done by analysing the students' individual final reports and a survey, which was distributed three months after the completion of the course. 15 out of 17 students replied to this survey (88%).

100% of the respondents agreed that "Working in groups contributed to the learning process in the course". 14 students disagreed with the statement "The course would be better if we did not work in groups", and 14 students (93%) agreed that "Working in groups is very suitable for Designbuild courses".

However, although students appreciated the added value of working with other students, it was not achieved without difficulties. One student wrote in his final report:

> There is a specific subject, and it doesn't matter how much experience you have in it, it will always be a new experience – this is working with people you don't know [--] As a group we had a strong will that our proposal would be constructed. The big challenge though, was to decide together on the design of this proposal and we had many conflicts around this.

Tucker and Abbasi (2012) identified that most design students working in groups will try to avoid conflicts by working on individual tasks rather than working together on the same task (Tucker Richard, 2012). Indeed, we found evidence for this in the final reports. For example, one student wrote:

> "The division of work in our group was very clear. Of course, there was mutual help but at the end of the day, we rarely worked together on significant issues"

Nevertheless, the same student also thought that there can be a place for both approaches at different stages of the work:

> "different approaches can fit different stages. Working in parallel can be useful in the early stages of the investigation, when collecting and analyzing data. However, if we continue to work individually when there is a need to develop a common concept or to accept certain design solutions, there is a chance of conflicts."

This suggestion was reinforced in the survey when 11 students (73%) agreed with the statement that "CDM is suitable at the stage of choosing the project to be realized".

On the other hand, there was less agreement on the statement that "CDM is suitable for group working at all stages of the course". Only 7 students agreed with this statement, 3 disagreed and 5 stayed neutral.

Therefore, it is clear, that there is a need for an articulated process of group decision-making to be used at these stages of the course when crucial design and strategic decisions had to be made collaboratively – such as the stage when students need to choose the design proposal to be constructed. CDM process was found effective for this purpose probably because it was applied in a small group of motivated and committed students with a high degree of affinity and a clear common goal – all the conditions which were identified in chapter 2.

7. Conclusions

> "I can say that effective teamwork, which facilitates a combination of disciplines, minimizes competition and maximizes collaboration, is the proper learning environment for me. It enables me to flourish in many creative ways and to maximize my skills. I would be happy to find myself in similar courses and working environments in the future". (A student in the course)

This paper described a Consensus Decision-Making process during a Designbuild studio course for third-year architecture students at Bezalel Academy of Arts and Design in Jerusalem. The students' task was to build a full-size entrance pavilion to the Department of Architecture using natural bamboo poles. As a Designbuild course, it was a highly collaborative experience where students worked in groups and dealt with "real life" aspects of construction, such as material testing; detailing, craftsmanship, fabrication processes; the means and methods of on-site construction as well as budgeting and construction costs. Groupwork was found to contribute to learning processes in the course, however, it also produced many conflicts along the way.

A crucial point in the course was the selection of the design proposal to be collaboratively constructed. CDM was used at that stage to facilitate deep engagement of all participants in the design development and the



Figure 5. The final Pavilion. Image: Barak Pelman

construction phase which followed. It was also used to improve the design itself by raising concerns and conflicts and turning them into a new design brief. CDM was found effective for this stage probably because it was applied to a small group of motivated and committed students with a high degree of affinity and a clear common goal.

The theoretical background suggested that CDM could be also used to synthesize conflicting ideas and thus to facilitate design innovation. Some design innovations were clearly developed through the course. To mention two, the development of the hanging bamboo poles which allows them to move with the wind, and the 3D printed joints which are responsible for the floating experience of the pavilion (NoCamels, 2017), however their direct relationship to the CDM process still needs further investigation.

Barak Pelman
Lecturer, Bezalel academy of Arts and Design, Jerusalem, Israel
barak.pelman@post.bezalel.ac.il

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Experience and design a critical thinking incubator

David Serra Navarro

Abstract

The practice of design, as a tool for participation in decision-making, and participation mediated through design refer us to an idea of horizontal negotiation: a challenge for the contemporary designer where he becomes an ethical and aesthetic manager in a globalized context. As Bonsiepe describes us, "According to liberal thinking, democracy is synonymous with the predominance of the market as an exclusive and almost sanctified institution to govern all relations within and between societies" (2006). In this market reality, is there room for a design creation on the transversality of the critical and democratic space?

In recent years, the idea of strategic design: "Design as a resource for the challenges of contemporary managers – Socially Responsible Interprise." (Borja, 2006) has awakened corporations interest as a management model. A positioning that places design management in an interdisciplinary crossroads, in which process becomes the axis of the design definition. In a broader sense, contemporary design has experienced three important twists (Celaschi, Celi and Mata-García, 2011) that we could list as the transition from function to purpose, from user-centered design to co-design, and especially from product design to process design.

Our interest, where design is a meeting point of different values, we will focus on the project WDF: We don't fit (Berta Vallvé, 2017 – ESDAP fashion department), a sample of experiential involvement between designer and user. An open dialogue that describes a social transformation originated from mentoring and mediated participation through design. The linking of the notion of participation with the design concept, takes us to a state of encounter that Nicolas Bourriaud interpreted as a collective elaboration of meaning (designer as a semionaut).

In this context of design research, as a systematic search and acquisition of knowledge related to design and design activity (Bayazit, 2004), the WDF project aims to question the established social structures, the systems, the relations of power and hierarchies, the apparatuses of normalization and the way it acts on dissident bodies and identities. It is a set of fashion design pieces that were thought for people that had experienced struggles with society norms, and that means a constant conflict between the individual and the conventional clothing. An experiential story

that becomes tangent through design, and that suggests learning methodologies in the context of our design education. The figure of the designer as a mediator is acquiring more prominence in the current society. The following text/film wants to make visible this catalytic project to understand this emergence from the collaborative practice.

Theme: Conflicts
Keywords: participation, design education, semionaut, co-design, activism

1. Introduction

One of the challenges of ESDAP Catalunya (High School of Design and Visual Arts of Catalonia) is to approach design in a critical sense and develop the projects of its students as a strategy to understand and improve the social complexity of our world. The design as a meeting point of different values. We will focus on the project *WDF: We don't fit* (Berta Vallvé, 2017 – ESDAP fashion department), a sample of experiential involvement between designer and user. An open and dialogue that describes a social transformation originated from mentoring and mediated participation through design. The linking of the notion of participation with the design concept, takes us to a state of encounter that Nicolas Bourriaud interpreted as a collective elaboration of meaning, the designer as a semionaut.

In this context of design research, as a systematic search and acquisition of knowledge related to design and design activity (Bayazit, 2004), the *WDF* project aims to question the established social structures, the systems, the relations of power and hierarchies, the apparatuses of normalization and the way it acts on dissident bodies and identities. It is a set of fashion design pieces that were thought for people that had experienced struggles with society norms, and that means a constant conflict between the individual and the conventional clothing. An experiential story that becomes tangent through design, and that suggests learning methodologies in the context of our design education. Design as activism: "The design act is not a boycott, strike, protest, demonstration, or some other political act, but lends its power of resistance from being precisely a designerly way of intervening into people's lives. This is a subject matter for design research" (Markussen, 2011).

In essence *WDF* grows in the notion of *alterity*. This project raises the question of how to live together, of the common good, and of what connects us. It works the otherness, the relationship between the dominants of culture. The management of the designer of the singular space of the individual in front of a model of sexuality that can be discriminatory and exclusive. As Jacques Derrida pointed us:

> "The relationship would not be a-sexual, far from it, but would be sexual otherwise; beyond the binary difference that governs the decorum of all codes, beyond the opposition feminine/masculine, beyond bisexuality as well, beyond homosexuality and heterosexuality which come to the same thing. As I dream of saving the chance that this question offers I would like to believe in the multiplicity of sexually marked voices. I would like to believe in the masses, this indeterminable number of blended voices, this mobile of non-identified sexual marks whose choreography can carry, divide, multiply the body of each 'individual', whether he be classified as 'man' or as 'woman' according to the criteria of usage." (Derrida, 1985, p.163)

This social reality, an ocean of individuals difficult to fit into standardized labels, is also our world. Derrida describes a multiplicity of individuals and experiences, of those users who cannot remain outside Design. The main challenge of this project is to hybridize with its users, and establish a creation process that ends in the object. The objective of this research is to show the key phases of development, identifying a transversal sense of Design that brings us closer to the designer-mediator concept: a committed designer who aims at a sustainable future, who requires special attention from educators and / or institutions linked to Design. This enclave determines a transdisciplinary curricular orientation among the social sciences, the humanities and the arts; and tries to relate a conceptual pattern that expands the design action from the critical standpoint. The figure of the designer as a mediator is acquiring more and more prominence in today's society. The following text/film[1] wants to make visible this catalytic project to understand this emergence from the collaborative practice.

1 The WDF project takes place in parallel with a documentary under construction. Watch the summary: https://vimeo.com/esdap/wdf Recovered March 10, 2018.

2. Alterity: conceptual approaches

As a conceptual approach we will highlight some positions of thought that draw us the critical basis of WDF, a preface of intentions in which the work has been developed. A way to connect the design to ideas that go beyond functionality and that involve integrating: life and design, identity and subject, object and world in an ocean of intersubjectivities.

2.1 *L'écart* ("difference")

The semantic meaning of the French word *écart* refers to concepts such as "distance", "gap", "separation" or "difference". However, it is of obligatory reference to understand this word through the thought of the philosopher François Jullien. *Écart* acquires a sense of unfinished distance, a relationship of fertility in which values are opposed, and where tensions are generated in an *entre* ("between"). As Jullien tells us, cultural identity is a reaction to globalization, but it also alerts us that the nature of culture is mutating and transforming itself, establishing a series of tensions (*écarts*) that give us different fecundities (*ressources*).

Rethinking the universal, the uniform and the common is the basis of its philosophical spectrum, which leads us to understand intercultural dialogue: *dia* (distance); *logos* (intelligible). Jullien[2] continues describing to us that a culture that stops transforming is a dead culture, it stops evolving. Likewise, he insists on the promotion of the Subject (not of the individualism imprisoned in his *self*) that introduces his "Self" into the world and allows him to "ex-ist". Thus, within the framework of culture, the debate between unity and diversity usually ends in a certain historicization that restricts self-critical values. As Cornel West argues: "the meaning of history must be linked to an expansion of empathy" (2000, pp. 43–44). Following this logic, as Huey-li Li concludes, "self-criticism is the key to demystifying the imposed otherness, to unveil the dynamic process of cultural hybridization and the formation of 'double consciousness'" (2002, p.144).

2 Context note according to Baptiste Mélès (2009): "Maybe Jullien's project was also influenced by Heidegger's questions about Eastern tradition. China would have been for him a mean for acquiring, by comparison, a better knowledge of Greece. When wanting to know our actual way of thinking, Foucault had been investigating into history, comparing for example biology with natural history. Wanting to become aware of the structural characteristics of European philosophy, Jullien compared it with Chinese thought. All in all, Jullien sought in space what Foucault sought in time."

2.2 Queer

The notion "queer"[3] is used to describe non-normative identities and politics.

> "A vital feature of Foucault's argument is that sexuality is not a natural feature or fact of human life but a constructed category of experience which has historical, social and cultural, rather than biological, origins. (...) Butler adopts Foucault's argument: 'sexuality' is discursively produced." (Spargo, 1999, p.12)

According to Butler the genre has a liquid corpus, a fluctuating character, which is constructed between the psyche and appearance. The "normative ideal" (Butler, 2007, p.71), the restrictive framework that allows the construction of identity of the subject also restricts. Those bodies and beings outside the normalized space become ghosts in a homonormalized social spectrum, and it means the exclusion of "other" identities. In this sense, the concept of the notion of queer is not an end point, but rather a "between" (*entre*) in which the necessary tensions necessary are given. Identity as a liquid definition linked to real-time experience. The deconstruction of homophobia, transphobia and fatphobia is found in queer bodies. Obesity and weight issues are socially constructed (Cooper, 2016).

2.3 Interstice

Following the footsteps of Foucalt, it is interesting to quote the term *interstice*, a limit, some "margins" (Derrida) in which thought occurs ("thinking of between"). A critical space that does not act by comparison and that is configured by opposites, such as body and identity. Félix Guattari and Gilles Deleuze also immerse themselves in the interstitial spaces to find the keys to the production of subjectivity, a relationship

3 "Queer" has sociopolitical connotations and is often preferred by those who are activists – namely, by those who strongly reject traditional gender identities; reject distinct sexual identities such as gay, lesbian, bisexual, or straight; or see themselves as oppressed by the homonormativity of the politics of the broader gay or LGBT community. In this usage, queer retains its historical connotation of "outside the bounds of normal society" and can be construed as "breaking the rules for sex and gender". It can be preferred because of its ambiguity, which allows queer-identifying people to avoid the sometimes rigid boundaries that are associated with labels such as gay, lesbian, or even transgender.

between the individual subject and society, a subject that is constructed as a collage (*assemblage*) of experiences. For Deleuze and Guattari "each individual is an infinite multiplicity" (2007, p.280) that comes together briefly through movement and rest. This idea itself will also be picked up by Nicolas Bourriaud to understand contemporary artistic action, the relational aesthetic conceives the material reality of the relational form, since the formal experience of the relationship produces reality; that is to say, according to Bourriaud there is no real existence without interaction, which is what promotes the democratic forms of artistic participation (Serra, 2013). Bourriaud (1998, pp. 45–6) argues that by setting up real interactive situations in the gallery, relational works of art do not 'represent utopias' but actualise them, creating positive 'life possibilities' as 'concrete spaces' rather than merely fictional ones.

> "The activities of DJs, Web surfers, and postproduction artists imply a similar configuration of knowledge, which is characterized by the invention of paths through culture. All three are 'semionauts' who produce original pathways through signs. Every work is issued from a script that the artist projects onto culture, considered the framework of a narrative that in turn projects new possible scripts, endlessly. The DJ activates the history of music by copying and pasting together loops of sound, placing recorded products in relation with each other. Artists actively inhabit cultural and social forms. The Internet user may create his or her own site or homepage and constantly reshuffle the information obtained, inventing paths that can be bookmarked and reproduced at will. When we start a search engine in pursuit of a name or a subject, a mass of information issued from a labyrinth of databanks is inscribed on the screen. The 'semionaut' imagines the links, the likely relations between disparate sites. A sampler, a machine that reprocesses musical products, also implies constant activity; to listen to records becomes work in itself, which diminishes the dividing line between reception and practice, producing new cartographies of knowledge. This recycling of sounds, images, and forms implies incessant navigation within the meanderings of cultural history, navigation which itself becomes the subject of artistic practice. Isn't art, as Duchamp once said, 'a game among all men of all eras?'" (Bourriaud, 2001, p.18).

Working on aspects of Design from relational aesthetics, opens the door to spaces of intersection that can enrich the insights: a way to understand the problems and fragments of reality in a framework built by intersubjectivities. An open dialogue-process.

3. Method and process

The structure of the WDF project aims to work from a conscious and coherent design, creating pieces that impregnate the experiences of each person and personal symbologies, documenting all the extraction and creation process.

We Don'f Fit, default goals:

- Develop a project with social utility
- Create a coherent and consistent project with my ideals
- Find a coherent solution to work activism with clothing
- Visualize problems of the standardization system
- Create pieces capable of wearing bodies and non-normative identities
- Getting the project to become a broadcast speaker
- Give voice to people portrayed, without speaking for them
- Break with hegemonic discourses
- Provide a new perspective to the public/spectator
- Become an element of reflection and conscience agitator

As Berta Vallvé clarifies us, this project based from the aspect of clothing is intended to work for these movements and processes of struggle using design as a tool for reflection, but also in this case as a tool of participation to achieve a project of collective illusions. Initially the people involved in this project, real protagonists, were constituted as a non-mixed team composed of women and trans feminists. Design thinking depends upon observing how people actually use products, and listens to particular stories and unique feelings. Through different interviews[4] they went "undressing" explaining their experiences, a process of extracting information that we synthesize below in three sections: *We don't fit in your white men's world* (Mariana); *We don't fit in your closet* (Kai); and *We don't fit in your binarity* (Mario).

4 The first question was: "Do you consider yourself normal?"



Figure 1. Mariana, Kai & Mario, are the "individuals-pillars" from which the design project has been developed. Photo by Berta Gonzalez Dòria, 2017. Watch: https://vimeo.com/233494227 Creative Commons "By-nc-sa". Recovered October 1, 2017.

WDF	concepts		symbolic objects
Mariana	machismo racism exotization glances sexualization discrimination	vulnerabilities meat color sorority feminisms black feminisms latin feminisms	elephant dance
Kai	fatphobia machismo monosexism biphobia gordei reappropriation corny	tags pluri not monogamous feminist non-binary norm intersectionality	Polyphemus spiked collar
Mario	trans transphobia binarism male female	body pigeonhole To fit in traffic feminism	testosterone binder feminist symbol

Table 1. Information extracted through interviews



Figure 2. Berta Vallvé working/dialoguing in the different sessions/encounters of experiences. Watch original interviews: https://www.youtube.com/playlist?list=PLCXfSo5kujmmsVXEoIHB7FdwJSPJWOSJl Recovered January 14, 2018.



Figure 3. Mood board sample. From left to right and from top to bottom: 1: Reig, P. "Oil portrait #005", print on wood; 2: Mario's picture taken from facebook; 3: Retrieved December 11, 2017, from www.ajsonline.org



Figure 4. Berta Vallvé working following deconstruction processes, 2017.

In parallel, during the creation process, the different insights were transmitted to visual mode using the resource of the personalized mood boards[5], *assemblages*, those constructed from the selected concepts, experiential material and direct collaboration. Materialize the symbology, dump the symbols in its graphic dimension. Here is one of the designer's key actions, making knowledge visible. As Ezio Manzini (2015) described us: "Knowledge and tools need to be developed by experts. That is why

5 "Assemblages" of images and, less frequently, objects, which are used to assist analysis, creativity and idea development in design activity.



Figure 5. "Binarism is for computers". Capture from WDF Editorial work. Photo by Berta Gonzalez Dòria, 2017.

design education is needed, but probably needs to rethink how design is taught. Designers need to develop their capacity to see and visualize complex structures". In the same sense, as the study by McDonagh and Denton (2005) concludes, this technique strengthens creativity: "Experienced designers who use and teach mood boards would claim they can liberate, inspire and support creativity. In turn users need to feel that the product has a special meaning for them. This requires significant empathy, vision and flair by the designer or design team".

The visual extraction resulted in a significant set of referential elements, the basis to be able to give concretions to the designer and be able to start working the pieces. Mariana: flesh color (*color pele*), color palette limitation, oversexualization, lips, double action hands: attack and sorority; Kai: non-static, bright colors, unicorns (myth of Polyphemus), curbs; Mario: liquid, border, map-body, political struggle, and reticle.

4. Discussion and conclusion

As briefly related, WDF is installed in a stage of "dissensus" (Rancière, 2004) in which we have focused on the process and social involvement. While the WDF also considers a special sensitivity for the fabrics used

and an environmental conscience, our interest lies in showing a bold approach: a fearless design activity. An "*écart*" between the Derridian deconstruction and the criticism of Judith Butler. An experiential fusion between designer and reality, and a rethinking of how to act in front of the impositions of the mainstream and how to make tangible the "double consciousness". Regarding the process of realization, interesting by the techniques used (stamping, tricotage, moulage, tissue creation...), we will not refer on this occasion, although it could complement the set of the activity of the designer and the strategies used to materialize symbolic imaginaries. We simply want to put the emphasis on the WDF activist lace. Design as a practice of empathy.

The "empowerment" is defined as a condition and an action: the one of giving power (Bracqué & Biewener, 2013), an emergent notion in relation to social design that seek in the process the active participation of the subject. In our case, this empowerment is produced through direct intervention on the final design object, and the design becomes the engagement between the subject and his universe. Meanwhile, the designer becomes an "active intermediary" of social capital, an attribute of collectivities, social groups and communities (Durston, 2000), in which participants are established in a horizontal framework. This engagement allows a deeper definition of the insights of the collective knowledge. The relevance of *We Don't Fit* lies in the tensions between the "universal" stipulated by market norms and paradoxically fixed by "power", and on the other hand, the opening of new channels of diffusion, of social change, that are transmitted by one's own body of the participant. An activist position in which the user and (his) design crystallize into a single element, generating a new point of view of the imposed values. Therefore, the border between performance and design becomes finer, the significance values are amplified, and the figure of the maker DIY (Do It Yourself) is reformulated as the figure of DIYWY (Do It Yourself With Yours). Through the traceability of the actions described, and the reflection of the semionaut designer, we can see the importance of cross-disciplinary subjects, in which design and society become authentic pillars of the academic curriculum of our higher education design studies. This sets a challenge for teachers that requires updating, coordination between the different itineraries, and critical capacity to guide young designers towards a global, yet diverse future.

In this paper, complemented with audiovisual material, we have shared our reflections of designing 'with' and 'for' a participatory design,

by opening the design process citizens are empowered. As such, future research will be directed to consider the ethics of engagement, and assess the ability of the designer to penetrate stereotyped circles, opening new horizons to understand our world. As suggested by the author of WDF: In the context of invention defined by Focault and from a process of self-empowerment (related with the reappropriation of a defined space outside the norm), Preciado[6] proposes the creation of new machines that produce truth (*nuevas máquinas de producción de verdad*) that turn into a resistance to this constant normalization. As we have seen, design and activism are not incompatible, design can be a powerful tool to make visible the values of a changing world and to approach ethically towards reality.

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David Serra Navarro
ESDAP Secretary,
PhD researcher at the ESDAP Catalunya, Spain
dserra8@xtec.cat

6 P. Preciado en Pienso, luego existo. Retrieved December 3, 2017, from http://www.rtve.es/alacarta/videos/pienso-luego-existo/pienso-luego-existo-beatriz-preciado/1986547/

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Creative communication design

Communicating Holocaust to younger generations

Kjetil Vaage Øie, Thomas Lewe

Abstract

This paper focuses on communicating the Holocaust to younger generations and reports how young university students from the fields of media, art and communication approach this communication challenge. The Holocaust memory culture has long relied on witness descriptions as a central way of conveying the horrors of 'The Final Solution' of the Nazi regime. When these witnesses' stories gradually disappear, communicating them includes a transition from lived culture to the culture of experts and mediated communication. This happens at the same time that the impact of legacy media is changing, the habits of young people's use of media are in a flux and the political European landscape can be considered challenging. The empirical data in this paper has been gathered through two annual 10 days "Litzmannstadt ghetto workshops" (Łódź, Poland), in 2016 and 2017 where the students (40 in total) developed ideas and concepts on communicating Holocaust. The aim of the workshops has been to facilitate arenas for collaborations across disciplines and cultures to address and highlight the importance of future Holocaust communication. The papers` theoretical inspiration embraces Hans Joas (1996) concept of creative action and the concept of communication design and considers them as useful concepts through which to investigate the design process of Holocaust communication. The study finds that place, emotions and situational elements were among the main drivers for the students' creative communication design. The cultural background of the students` influenced the discussion and outcome more than the cross disciplinary. Furthermore, we find that their concepts differentiate from traditional media representations of the Holocaust, but that their vision for future Holocaust communications is reminiscent of traditional forms and channels of distribution.

Theme: Conflicts
Keywords: communication design, interdisciplinary collaboration, design processes, media communication, intercultural collaboration

1. Introduction

We have asked and observed young media, art and communication students how they envision future narratives and how they plan creative

communication concepts dealing with the Holocaust. This project started with a concern on how the strong narratives of Holocaust eyewitnesses will be transferred into contemporary and future narratives. Until now, the eyewitnesses' stories from the Holocaust have been among the most important narratives in forming the memory culture associated with the Holocaust (Lenz, Seeberg et al. 2013). These survivors have contributed to historically important and impactful documentaries, news pieces, lectures, textbooks, interviews and school visits. Since the era of eyewitnesses of the Holocaust soon will end, focus will move to the material culture of commemorating. This includes a transition from lived culture to the culture of experts and mediated communication (Allmeier, Manka et al. 2016). At the same time the impact of legacy media is rapidly changing and the habits of young people's use of media are in a flux. In this normative project, the authors find this transition both challenging and scholarly interesting. Inspired by Hans Joas concept of *creative action* (1996) we argue that the situational and emotional dimensions play a large part in the process of communication design. According to Joas, these dimensions have been underplayed in dominant understandings of human action.

Considerable work has been done on Holocaust representations and communication. Among the most known representations of the Holocaust within the popular culture are those by Steven Spielberg (Schindler's List), Claude Lanzmann (Shoah), Philip Roth (writer and novelist), Alain Resnais (Night and Fog), Art Spiegelman (cartoonist), Anne Frank, and Roman Polański (The Pianist). These have reached a broad audience and contributed to the debate of Holocaust communication. Artistic approaches to commemorate Holocaust can be exemplified by the artist Gunter Demnig through his "Stolpersteine project". He installs brass plaques in the pavement in front of the Jewish victims' last address of choice. These stumbling stones, which can be found all over Europe, are made to memorializing the victims of National Socialism. Another artistic approach is the project "Children of Bałuty" by artist Katarzyna Tośta. A series of local wall stencil paintings, trace and visualize identified children victims of the Litzmannstadt ghetto. Museums such as United States Holocaust Memorial Museum produce various Holocaust representations and much of the current work focuses on engaging young audiences, often through new digital technologies. Holocaust narratives and representation on how to narrate a trauma, or how to visualize the Holocaust is a topic of continuous debate amongst scholars and artists. Much of the

debate departure from Adornos famously known (and often misunderstood) statement “No poetry after Auschwitz”. Few studies, if any, have explored the creative elements operative in this production process.

By studying young future communicators, we hope to learn about their attitudes and visions for their future production practices. This could potentially give a direction on future communication of sensitive topics like war, conflicts, refugees and forced labour.

First, the article will contextualize the workshop and the workshop location. Thereafter, we present two theoretical approaches within action theory and design suitable to the process of designing communication on sensitive topics such as the Holocaust. These approaches have been the theoretical inspiration and worked as a bridge between disciplines in the Litzmannstadt ghetto workshops. After presenting the method and empirical data, the article will present findings from the two workshops.

1.1 Workshop background and context

We have brought together voluntary students from different nations and fields of education to find out how they can generate creative communication and concepts on the Holocaust. The area of the former ghetto Litzmannstadt worked in these 10 days workshops as a kind of social laboratory and a case study representing parts of the Holocaust.

The Litzmannstadt ghetto has, in contrast to many other ghettos in Europe, not been destroyed at the end of the war. Prior to World War II, the Jewish community in Łódź, counting approximately 233,000 persons, almost one third of the city’s total population. During the war, in February 1940, the Nazi occupants created the second largest Jewish ghetto of Poland in Łódź. More than 200,000 Jews were estimated detained, and passed through the ghetto. By the end of the war, only 877 people of Jewish origin were left in the Łódź ghetto (Trunk 2006). The ghetto covered the huge area of the Bałuty district, which today still is a busy district. Despite several attempts, the historical existence of the Ghetto in contemporary Łódź has remained rather invisible and the residents today have no relation to the Jewish culture. Bałuty´s inhabitants experience grave challenges in their daily lives facing high unemployment, violence and a high crime rate, in addition to poor living conditions. Many of the buildings, in Jewish ownership before the war, still have unclear ownership. Due to this lack of clarity, little or nothing has been done with these buildings, presently being in desperate need of rehabilitation.

2. Theoretical framework

2.1 Bridging communication design and creative action

Developing communication concepts requires a creative design process. Dorst & Cross (2001) consider studying creative design problematic because there is no guarantee that a creative "event" will occur during the process. In addition, how do we identify something as creative (Dorst and Cross 2001)? Dealing with creativity in design processes is thus a challenging exercise. Everybody acknowledges it happens, but very few can identify a certain point in the process, where the key concept began to emerge. Creativity in design processes is often characterized by the occurrence of a significant event. Sometimes, this event occurs as a sudden insight, but more often, it is identified in retrospect. Those professionals, doing this for a living, have developed strategies and processes for their goal-oriented and structured creative work, but this planned creativity has not always been part of the designer's repertoire. This skillset is often considered as tacit knowledge and surely develops with experience.

In this paper we use the term *communication design* to describe the students' method of developing Holocaust concepts. The field of communication design can be placed both within the practical design studies, and within communication studies. We considered this a suitable point of departure, theoretically, to describe concept development on sensitive topics. Communication design can contribute both by "making things" to further develop existing theory and generate new knowledge, but also to use theory to contribute to a certain practical concept. Communication design as a term and as a field has slowly gained some scholarly weight (Frascara 2004, Skjulstad, 2007, Morrison 2008, Skjulstad, 2008, Løvlie 2016). Most academic work and artwork related to communication design today can be placed in the fields of graphic or visual design, social design and design research. We argue along with Skjulstad (2007) that the term should be treated more broadly, not limiting itself to visual or social design disciplines only. This would make such approach more applicable as a process and as a way of thinking. Further, the term carries an understanding of something strategic, controllable, made by humans, temporal and situated, and still, often hard to describe and to apply directly as a method. Frascara (2004) emphasizes that to understand visual communication design, we have to think more about actions than objects. The designer generates the communication by designing an event. This is an act where the public interacts with the design, therefor designers should

be interested in, and aim on, designing communicational situations. Frascara therefore suggests that we need to study messages, not only the visual elements, as have dominated the designers focus in the past (Frascara 2004, p.13). In this paper we focus on communicational actions and situations in the developing process rather than the public interaction with design.

Focusing on communication design activities, we must understand the action of the practitioner. Almost all contemporary theories can be characterized by a specific term of action. We find these actions either as fundamental approaches or as ongoing debates in all disciplines. Today, Jürgen Habermas' theory of communicative action, and Giddens theory of structuration, serve as the most well-known (Joas 1996, p.2). This article suggests that one fruitful approach can be to include Hans Joas' model of *creative action* into the study of communicating the Holocaust. By bridging *communication design* and *creative action*, we get a practical approach which also embraces creative elements into communication design process.

2.2 Creative action includes situated, non-rational and emotional elements into the action of designing

Hans Joas is one of the contemporary contributors, especially inspired by John Deweys pragmatism, who has developed action theory further. Joas (1996) uses the term "creative action" (Kreativität des Handelns), and his reception of early American pragmatism can be placed within the theory of action. Even though almost all the social and cultural sciences today have efforts in constructing a theory of action, there is very little overlap between the different branches of sciences when it comes to understand and treat the concept of action (Joas 1996). Joas shows that the idea of creativity in sociology only has occupied a marginal position and suggests that a third model of action should be added to the two predominant models of action. These predominant models are, according to Joas, the rational and normative oriented model of action. Joas third model focuses on the creative character of human action (Ibid p. 4). He does not see the model of creative action as an extra set of action, but rather to serve as overreaching exemplification that there is a creative dimension in both rational and normative models or approaches of action theories. His work can partly be seen as a critique of Habermas' theory of communicative action. According to Joas, Habermas limits himself in his theory of

communicative rationality to deal with instrumental and normative elements in relation to action. It does not sufficiently catch the creative element, the spontaneity and the emotions, constituting action.

Joas argues that there are several reasons why one should not follow economic, sociological and psychological theories of action that are based on rational action as their starting points. One reason is that it points automatically to a non-rational counterpart. This creates a frame, forcing all kinds of actions to be treated with rational action as it comparable counterpart (Joas 1996, p.146). In this project, we strongly play on emotions and spontaneity, which often appear doing fieldwork or visiting specific places. Emotions are often seen as non-rational within these rational theories. Furthermore, the rational action model also has problems dealing with deviations from strictly goal-oriented action. This excludes actions, clearly distinguishable from goal-oriented ones, such as spontaneous emotional action and reflective moral action (Joas 1996, p.146). In the Litzmannstadt ghetto workshop, the students face continuous non-rational action resulting in emotional and moral reflections they base their creative work on. We believe this could play a stronger role in sensitive topics like the Holocaust, more than in many other projects.

3. Methods

The workshops are educational and interdisciplinary, aiming to increase the student participants' awareness of challenges in communicating sensitive topics. Their task was to make concepts, communicating the Holocaust to younger generations. They worked together in cross-disciplinary teams and used the physical location of the ghetto as their case study. The students were given lectures, both from participating scholars and external experts, dealing with the history of the ghetto, racial hygiene, and the current political situation. An important part of the workshop was the visiting of relevant museums such as the Museum of the Second World War in Gdansk, the POLIN Museum in Warsaw, and the death camp of Chelmno. In the workshop we arranged a meeting with a ghetto survivor, sharing her story with the students.

While the educational project as a whole contains many interesting aspects, this paper limits itself to investigate the students' creative concept process and how they envisioned future Holocaust narratives and forms. A total of 40 voluntary students from 7 different nations partici-

pated (China, Germany, Iran, Norway, Pakistan, Poland and USA), supervised by 10 academic staff members from four universities in Germany (Lemgo), Norway (Bergen and Volda), and Poland (Łodz). They were students from the fields of journalism, art and design, media production, communication, history, and architecture. The students were recruited based on a letter of motivation and meetings. In addition, we secured a diversity in competence and gender balance.

The empirical data was collected through observations, evaluations, individual interviews, surveys and the students' finished concepts from two workshops in September 2016 and October 2017. The observation focused on the participants' creative design process materializing their ideas into presentable concepts. We paid extra attention to the students' discussions, dealing with questions about how, in what form and for which target group the concept should be developed. Observational notes were taken during the workshops and the evaluations were collected shortly after the workshop. As for this paper, we have particularly looked into feedback dealing with questions about the most memorable experience, their experience of working in interdisciplinary and international groups, and the importance of the ghetto location. Shortly after the workshop, we conducted and recorded individual interviews with some of the students, focusing on their desired media consumption and habits, and their view on mediation of sensitive and conflict issues. They were also asked about how the Holocaust should be addressed and mediated to future generations. The developed concepts, presented in a final meeting, reflected the students' suggestions for effective and emerging ways of communicating the Holocaust to younger generations. In the concept developing process, the students were free to choose any angle or direction within the workshop topic.

We consider the participating students as an interesting object of study, since they most likely will play an important role in future media and communication content production. Their presumptions and assumptions will therefore work as a point of departure. We know, that these students will be socialized into the various institutions and communities of practices, affecting their identity, meanings, ethics, learning and production practices when they start working (Wenger 1998). But, those organizational and institutionalized practices will be different from today, and individual skills, norms, methods, and attitude might play a more important role in the future. According to Hudson and Zimmermann (2015), we see completely different media contents and approaches

today than what traditional mass media gave us, and still provides. Effective media messages today are not necessarily fixed representations through mass media in traditional formats, but rather projects focusing on an encounter, context-specific, highly personalized, situational, platform tailored and immersive (Hudson and Zimmermann 2015). That implies that earlier theories based on fixed representations and material interfaces not always fit these new practices. Taking this into account, we should be open-minded to future media production practices and assume that the communicators' skillset and the competencies will continually be adjusted, and maybe even replaced. Young students already have a different digital mindset and a different digital practice than older generations.

4. Results and discussions

The students' overall impressions of the workshop were very positive. They appreciate the opportunity to be part of it, and to meet other students and new friends. About half of the students reported to be well-informed about the second world war history and the Holocaust. Some of the students came from countries where this history barely is taught in school but have acquired some information later in life.

The most unison critique to the workshop was that it was too dense with lectures, museum visits, guided walks etc. Due to the emotional topic of the workshop, students felt a need for some time to cope with the various impressions.

> "It gets hard from time to time. It's emotional to work on a topic like the holocaust but it was definitely worth it." (John)

The following analysis will be presented in four parts where the concept development process is presented in the two first parts. In these parts the emotions, the workshop location and the intercultural cooperation stand out as key elements influencing the process. In the two last parts, the students' envision of future communication of the Holocaust and their concepts are presented. Here, the students tend to keep a rather traditional view on mediated communication, but at the same time they reveal advanced understandings of technology and new media as incorporated skillsets. All the persons are anonymized in the presentation of the analysis.

4.1 Concept development – The role of the physical location

The fact that the workshop is physically situated in the Bałuty district, the former Nazi ghetto, naturally evoked some emotional and morally binding experiences influencing the students in their action of designing communication related to the Holocaust. Many students were not able to foresee the magnitude of the physical representations of the Holocaust. How many people lived inside one room in the ghetto? How fast were diseases spread due to the lack of a proper sewer system? How was it like when 180.000 persons populated such a small area? These authentic surroundings gave experiences who expanded the participants' understanding and had a positive impact on the design process. But, at the same time it limited their creative actions since the students got overwhelmed with respect and humility, afraid of representing something wrong, or stepping on someone's toes.

Using physical locations as part of the workshop, shows that emotions and unplanned actions serve as significant factors in creative communication design. Their perception of the area changed immediately when having gained that physical experience. Most of the final concepts were inspired by such location-affected experiences. This correspond with Allmeier et.al. (2016) that argues that in the transition from lived culture to the culture of experts and mediated communication, the physical places can be perceived as "authentic" and play an increasingly important role in the mediation of Holocaust (Allmeier, Manka et al. 2016).

> "I didn't know that much about ghettos from the Second World War, before seeing it in real life. The fact, that the houses were still there as they were during the ghetto-times, was special to see." (Maria)



Figure 1. Past and present. Photo: Stefan Brajtera, https://refotografie.blogspot.no

> "After the workshop, I see that I not only fulfilled my desires to learn from both a research and empathetic point of view, but much more. I feel a much deeper understanding of and connection to the actual location of many of the events of WWII." (Lisa)

> "Walking through the backyard, the guide told us that even the smell was the same as during the ghetto. It felt like nothing had changed." (Peter)

4.2 Concept development – Intercultural exposure

In the planning of the workshop the organizers put a lot of effort into making the workshop interdisciplinary. This, we believed enabled the best learning outcome and the best results. The general evaluation survey showed that 95% of the students found it positive to work in interdisciplinary groups. However, when looking into the qualitative data (student reflection report, interviews and observation notes) the intercultural dimensions of the project was what really made an impression and what the students highlighted the most.

> "Due to the international group that joined us in this workshop, I developed a more global understanding of WWII. Not only do I know more about what happened in Poland and in Łódź, but I can see how others from global perspectives might understand this information. This international perspective allows me to communicate this information to a much broader audience both with my words, actions, and artwork." (Agnes)

By implementing an interdisciplinary approach to Holocaust memory, Michael Rothberg (2014) argues that the drivers of new conceptual frameworks within memory studies happen through media networks, imperial projects, global economy and migration. However, most of the memory studies inherited frameworks seem to derive from methodologically nationalist presumptions. These often fail to reveal the impact of cross-national and cross-cultural phenomenon (Rothberg 2014, p.125). Rothberg links this to the postwar processes of decolonization (Rothberg 2009). Even though the participating students did not aim towards developing new methodical framework, such transnational and cross-cultural impact was highly visible in the students' creative communication process.

> "I believe it helped me improve my work ethic, especially when working in a group. It also helped me realize the limits involved with design when it comes to working on sensitive and emotionally charged topics." (Muhammad)

In these workshops, the cross-cultural dimensions seemed to play a much more important role than interdisciplinarity. The results show that this is particularly visible in the ethical considerations during their process which again affected their communication design. Several of these experiences or incidents were related to some of the local Polish students, who lived with this history on a daily basis.

> "For me, I know enough. I therefor don't want to be reminded on the horrors in this place. I don't want to work in this way." (Polish student 1)

> "I read a book dealing with this place when I was 16. That was enough for me. I don't understand the need for more information and why one should could "feel" this history." (Polish student 2)

This came unexpected to many of the student participants who suddenly got a counter argument from the actual people living there. The discussion developed further with arguments trying to look further into the history.

> "We need to show the reality to the younger generations. Even though the reality is horrifying." (Chen)

> "It is not about us, privileged students. But we should have a responsibility to future generations. For the moment, the Holocaust is quite near in time, but in 50 years it will seem as a long time." (Anton)

In addition, some of the students from outside Europe contributed to perspectives not typical common for European students to be exposed to during a Holocaust project.

4.3 Students envisions to future Holocaust communication

The students were asked about how they envision and think future Holocaust should be communicated, and through what kind of platforms and channels of distributions. What struck us was the students' strong focus on the content rather than the new media perspectives. They were not occupied by fancy technology in the way one could expect, and the interview questions might have triggered. Instead, they focused on ethical considerations, emotional tailored stories, media accessibilities and the need for trustworthy sources when dealing with conflicts. In retrospect, we realize that several of our questions on these topics was poor, unprecise and filled with prejudices of young students view of new media. In many ways the students' considerations were close to what one could call a traditional view on media communication. Nevertheless, when studying their concepts, we can spot advanced new media technology and practices as part of their skillset, integrated in their solutions. It seems like this is a well incorporated and natural part of their repertoire. This could explain why their answers and group discussions were not dominated by specific technological issues, but rather by content and ethics, with the current European political climate serving as a backdrop.

Hudson and Zimmermann (2015) have studied a range of different media projects (mostly digital) in what they call a transnational environment. They have identified different moves, tactics or strategies that these projects are using (Hudson and Zimmermann 2015). These include for example use of maps and databases, micropublics, engagement through gaming, speculative and inviting collaborative zones where multiple temporalities, multiple artefacts, plural pasts and technology come together. We can see some of these elements in the students' concepts, though they don't consider these as Holocaust representations different from existing or traditional ones. They were more concerned about how the narrative could be as meaningful to individuals as possible. The concepts' scale corresponds with another of Hudson and Zimmermann's findings, namely that these media projects tend to be manageable by small, scalable production units.

4.4 The student Concepts, an excerpt

In short, the following concepts were presented for an audience in the end of the workshops:

Sounds from the past (2016). With a simple smartphone application and GPS technology, the user is guided around the former ghetto area only by the use of (authentic) sound from the daily ghetto-life. Through headphones, historical relevant sound material as well as ambience sound preferences point towards locations of interest, getting louder and clearer the closer one gets. Additional content can be activated in the app when arriving at the different locations. *Missing words* (2016). This concept is targeting young audiences at the contemporary students' area ("OFF" – restaurants, bars and shops) in downtown Łódź. In conjunction with the annual light festival of Łódź, an animated sequence, projected on one of the areas' huge walls, is telling the story of the former ghetto inhabitants' attempt to smuggle letters out from the ghetto to notify friends and family about their misery. Most letters were confiscated, but a major number was hidden and finally discovered after the war. The animated event is meant to combine the illusional storytelling with physical printed letters, the audience could pick and read, and by this achieve small pieces of knowledge about personal fates of the former ghetto community. *Tram to the past* (2016). Two contemporary tram lines are crossing the former ghetto in the district of Bałuty. Few inhabitants and visitors of Łódź are aware of the exact borders of the former ghetto area. This concept is aiming to supply tram passengers during the ride with historical information when entering the former ghetto area. Augmented reality in the window fields of the tram might be used to blend the historical environment of parts of the ghetto into the current environment. Authentic video material as well as reconstructed scenarios might be used. The

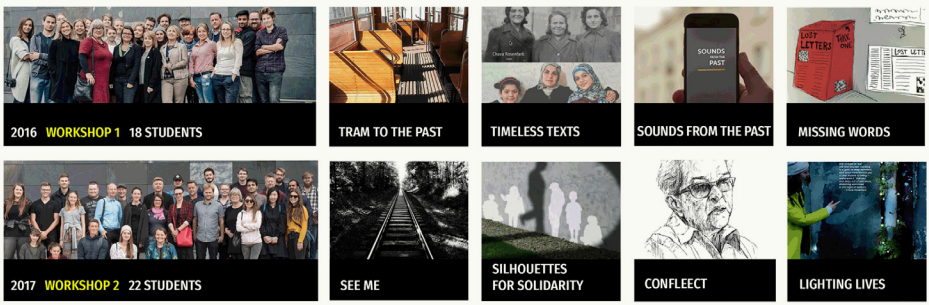


Figure 2. Workshop participants and the associated concepts

ride could possibly interact with the passengers by live events, infotainment and print material. *Timeless texts* (2016). This concept is a subscription- and web-based text message service. By entering a phone number, text messages from the Litzmannstadt ghetto inhabitants and from contemporary (Syrian) refugees will be generated a few times a week – capturing the cruelty of war – both then and now. The project wants to connect people and tell real life stories, where everything is actual material from real people. Diaries, poems and authentic pictures help telling stories from the past and the present to raise awareness about the danger of history repeating itself. *Silhouettes for solidarity* (2017). This concept is aiming to communicate with people on the "go" in a busy daily life by shadow installations, portraying different aspects of living in the Litzmannstadt ghetto. Pedestrians in Łódź are challenged to stop by and interact with these installations, take photos and advert through social media. These installations can expand to different areas of the city. *See me* (2017). This is a concept targeting a young audience by authentic stories, communicated through appealing to the four senses: Sight, hearing, smell and taste. In a physical dark container, the visitor enters different levels of experiences, communicating parts of an authentic story. Technical sensors and the physical isolation inside the container enhances the experience. Additional information is supplied both physically and on the web. The concept is a project aiming to expand to different cities of Poland and Europe, telling regional relevant stories and establishing its own, growing network. *Confleect* (2017). This concept is based on painted comics on the sidewalk with stories about civilians fleeing all over the world. The stories are physically drawn on the sidewalk – in the city where the story took or takes place. The stories are also connected through a webpage. This "movement" is intended to grow to many locations in the world – contributing to raise awareness of the cruelties of wars. Though the illustrations in their comic like style have an unpretentious visuality, they are carrying deep testimonies of tragedies and they honour suffering individuals. *Lighting lives* (2017). Light art installations are the main elements of this groups' concept. Targeting at locals of Łódź, addressable LEDs are placed in between bricks and cracks on Bałuty buildings during the already established Łódź Light Festival. The rather commercial festival is taking place in the glamorous and commercial main street of Łódź, while this "alternative" part of the festival is arranged in the former ghetto area. Yellow twinkling LEDs on walls, accompanied by stencilled poems and texts, will commemorate the ghetto victims and

survivors. These installations might be supported by other light activities and in its seriousness, establish a counterbalance to the commercial festival.

5. Conclusion

The analysis shows that the workshop participants take the challenge of future communications related to the Holocaust seriously, and they feel an actual responsibility. The students' feel they have participated in something important as a group, but also having expanded their individual mind and intercultural knowledge and skillset. The participants' main creative drivers in their concept were their intercultural encounter, the physical presence of the place, and the emotions that lead to. Though, the students were strongly inspired by those many existing Holocaust narratives, they were not depending on them or copying them.

Despite their advanced media habits and technology knowledge, they relate to the Holocaust as a sensitive topic in a more traditional way than the authors anticipated. It is not that they don`t want sensitive topics to be communicated through new media approaches, but they rather emphasise that the communication should be correct and balanced, available through multiple media channels, and they are more likely to fancy the personal stories within this topic. All this becomes more trustworthy distributed through a well-respected media institution.

We found the workshops fruitful and stimulating for exploring and to facilitating new ways of communicating the Holocaust. The social bounding between students in a new place supported the development and sharing of ideas. This also triggered their competitive creative abilities. Due to the results of using the ghetto as physical place of reference, the bridging between Hans Joas' *creative action* and *communication design* seems to be a suitable connection, allowing the creative design process to be affected and partly driven by non-rational emotional and situated experiences. These unexpected and situated experiences touched, moved and engaged the students, and they are therefore considered, in this case, just as important as any other controllable stages of a design process and intended activity.

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Kjetil Vaage Øie
Assistant professor,
Faculty of Media and Journalism
Volda University College, Norway
kvo@hivolda.no

Thomas Lewe
Associate professor,
Faculty of Media and Journalism
Volda University College, Norway
lewe@hivolda.no

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IV. TOGETHER, (RE)-ACQUAINT-ANCE WITH ACTORS?

Productions stemming from design are rarely the work of a single person. While the credits of a film present an exhaustive list of all contributors, this is not the case with fashion or even architectural projects, which nevertheless only emerge with the assistance of several professions. Whether visible or concealed, these credits reveal the methods of organising creative work. Whether vertical or horizontal rationales, very hierarchical or elective (collectives, associations, etc.), all are effective and impact design.

The Anonymous Descendants of Sher Shah Suri

Indrajit De, Saumya Pande

Abstract

A closer examination of craft and fashion linkage suggests a paradox: Fashion celebrates bold statements, creating a trend or following it but craft or craftsmen remain unstated slowly moving to oblivion leaving behind only an expression of brilliance. The research paper attempts to look beyond this paradox, search for the unstated, unseen, unheard of skilled hands that fuel a million dreams and set the context of how fashion is lived, loved and patronized in our urban world. Anybody remotely working with any aspect of design and design education cannot underestimate the force that lies with the rural craftsmen in India. The paper is a reflection on our ongoing women empowerment initiatives in Kishanganj district of Bihar and a broader push towards creating awareness about this hitherto unknown force. Kishanganj is home to two different ethnicities; the Surjapuri who are the native residents and Shershabadi who have migrated from the state of West Bengal and blended seamlessly with the locals. The migration of the Shershabadi not only brought people from one state to another but also their skills and idiosyncrasies; be it knowledge about self and environment, skilled hands, visual vocabulary, craft of quilting layers of used saris or making hand fans, setting them apart from the rest. Primarily an agricultural community, the need for survival led them to "tobacco leaf rolling (bidi)" as a supplementary occupation. Inspite of the evident health hazards, the practice goes on today in almost all the Shershabadi villages. The objective of the research is to document the skilled hands of these women, their proud characters and pain of migration translating into their daily attires, rich dialects and beautiful quilts that they make only for their personal usage resulting in their uniquely evolved vernacular. The focus is not only an anthropological documentation of the quilting process locally referred to as "Sujni" but also to place it as an offshoot of the traditional Sujni embroidery in terms of differentiated stitches, mathematical pattern and local dialect based vocabulary together underscoring the need for unique identification of its own. The hope is to collaborate with the local grass root level workers and people of influence in order to create an enabling environment together. This should generate enough interest in the right media so that an alternate occupation can be crafted incentivizing the women to move away from the bidi rolling. Their individualized expression of quilt making both for personal

and commercial purpose will surely catapult them from the background to the much deserved foreground in near future.

Theme: Actors
Keywords: skilled-hands, rural-craftswomen, women-empowerment, migration, quilting

1. Introduction

Sir David Frederick Attenborough, the 91 years old broadcaster and naturalist, once famously quoted,

> *A hundred years ago, there were one-and-a-half billion people on earth. Now, over seven billion crowd our fragile planet. But even so, there are still places barely touched by humanity."*

The vastness of Indian subcontinent and the diversity of its people will always leave space for discovering an unexplored craft. In spite of having researched and documented textiles and crafts all over the country, a small marginalized community in Bihar overwhelmed us with their sensibility, simplicity and sustainable practices.

Bihar, a state often subjected to indifference by the nation and sentenced to the clichéd identity of poverty, illiteracy and corruption, was once the epitome of knowledge and development. As per the Hindu mythology the central character of Sita in the epic Ramayana, belonged to

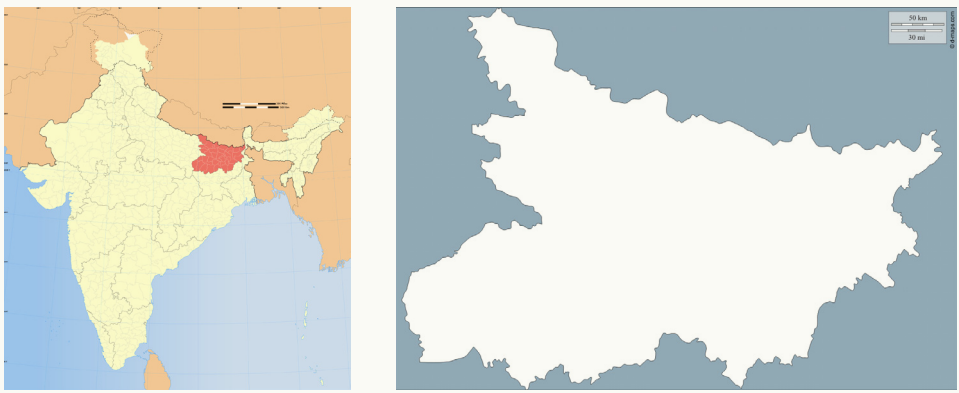


Figure 1. The geographical location of Kishanganj
(Map not to scale, sourced from www.d-maps.com)

the state of Bihar. During 3rd century BC, the mighty emperor Ashoka had his capital in Pataliputra (present day Patna, capital of Bihar). During the same time, Nalanda Mahavihara (university for Buddhism) became the seat of knowledge and wisdom that hundreds of national and international scholars sought after. It established the concept of organized transmission of knowledge in the form of university education and continued to impart the same for next 800 years.

For a state with such richness and diversity, it is ironic that today its national identity has only been confined to the beautiful lines of Madhubani paintings and multiple scams plaguing the politburo, however, there is more to the story than is visible.

This professional paper is a reflection of our ongoing attempt to bring out this unstated, unheard of story and empower the unseen skilled hands of the women artisans. The paper should be read as an inroad into the minds of these people, fierce sense of regional identity as well as their embodied existence in this complex social fabric, as witnessed through the textiles.

2. Literature Review

In the absence of any documented research work on the unique expression of Sujni embroidery done by the Shershabadi women, a considerable amount of secondary research is dedicated to understanding the theoretical frameworks of migration, its causes, causalities and potential impact on the development of the embroidery. Push-pull theories and 'gravity' models cited the distance, population size and economic opportunities in destination as the reasons behind human migration (Castles, de Haas and Miller 2014). Using these frameworks, we have tried to trace back the route that Shershabadi community might have taken to better understand the evolution of their design vocabulary and hand skills. However, how the "Sujni of Shershabadi" differentiated itself from the other Sujni and Kantha embroidery styles, remains a mystery.

3. Objectives of the Paper

The paper has the following objectives:

- To generate awareness in academic and industry fraternity about the Shershabadi women artisans, their regional identities and uniquely skilled hands

- To ensure economic independence and social acceptance of Shershabadi women and international recognition for their craft
- To facilitate national and international experts, be part of our collaborative social collective

4. Methodology Followed

The professional paper adopts a socio – anthropological approach to the study of the Shershabadi women artisans and their skilled hands. To get the required data for the study, a sample size of 250 artisans was selected. Through a combination of on-site skill development workshops, guided interviews with stakeholders and secondary research on migration of the community, a set of data was collected in the first stage. The data was analyzed to understand the socio – economic and geo – political evolution of this migrant marginalized community providing vital clues to their unique ways of embroidery.

5. Limitations of Present Research

The ongoing collaborative project is restricted to the 3 villages in Kishanganj district; Arabadi, Pothia and Chandpur with a combined women population of 150. The target sample size for our research is 250 women artisans over 12 months. From a cursory point of view, the craft is being practiced in many more villages and hence, it may be pre-matured to arrive at a hypothesis regarding its present state.

6. The First Visit to Kishanganj

Kishanganj is the only tea producing district in Bihar, located strategically on the Bihar-Bengal-Nepal border, cultivated by two rivers Mahananda and Kankai (also known as Donk). The region is known for its jute, paddy, corn and pineapple cultivation, fine variety of rice (“kala Maheen” meaning refined black rice) and being the corridor to the North Eastern states of India. Throughout our visit, we observed an unexpected yet beautiful use of metal roads that have been built to facilitate public transportation through the farm lands and back yards of the mud houses. Fair enough the roads are not only being used for ferrying people and goods but also encroached upon for sun bathing, communal gathering, animal grazing, drying of clothes, cereals and spices creating a kaleidoscope of senses for



Figure 2. The black rice of Kishanganj known as "Kaala Maheen" (Photographs ©Indrajit De & Saumya Pande)



Figure 3. Steps in jute cultivation: Soaking jute plants under standing water, vigorous beating of the plants in the water to separate the soft yarns from its bark and drying in the sun (Photographs ©Indrajit De & Saumya Pande)



Figure 4. Pineapple, one of the abundant produce in Kishanganj (Photographs ©Indrajit De & Saumya Pande)

us to soak in. May be this is what the balance in nature is all about: the urban planner takes rural land for building infrastructures and the rural resident takes over the urban infrastructure for daily rural life. Beyond massive industrial production, surreal consumption, euphoric communication and expansion of individual goals, there exists an entire world in rural India, unexplored, virgin, untouched by the notions of modernity, where design is not taught but experienced on a daily basis, where the designer (rural artisan) is not formally educated yet have the empathetic connection between their minds, bodies and the land beautifully realized through craftsmanship and artistic expressions. (Pallasma, 2015, p.3)

7. The Local Communities

Kishanganj is home to people of two different Muslim ethnicities; the "Surjapuri" who are the native residents and the "Shershabadi" who have migrated from the state of West Bengal and blended seamlessly with the locals. The migration of the Shershabadi not only brought people from one state to another but also their skills and idiosyncrasies; be it knowledge about self and environment, skilled hands, visual vocabulary, or craft of quilting layers of used saris, setting them apart from the rest.

However, the Shershabadi community is not new to migration. They are the ethnic Pashtuns who travelled from Afghanistan to India under the leadership of Sher Shah Suri in 15th century. Sher shah was a brilliant strategist who became the governor of Bihar under Mughal Emperor Babur, and later established the Sur dynasty in Delhi. His reformative policies included the introduction of Indian currency, "Rupiah" and modern postal system in India apart from reviving the medieval city of Pataliputra (present day Patna in Bihar). When Sher Shah died in a tragic accident in 1545 A.D., many of his infantry men stayed back in Northern part of Bengal and over the next 400 years migrated to the bordering state of Bihar in search of livelihood, priding themselves with the title, "Sher Shah Badi" meaning the followers of Emperor Sher Shah Suri.

8. The Primary Occupations

The rural lifestyle of the community still continues indigenous practices like building their mud houses, constructing the granaries, making of Khatia / Charpoy (cot), hand grinding of spices, making of sundried pickles, oil pressing, basketry and catching fish with indigenous tools and techniques. The area receives average rainfall and the fertile deposits



Figure 5. The mud houses of the Shershabadi community (Photographs ©Indrajit De & Saumya Pande)

from the two distributaries of river Teesta: Mahananda and Kankai. Naturally, the native Surjapuri community, the major land owners, are primarily farmers. Jute is produced extensively in this region. Exotic variety of rice like “Kala Maheen” meaning refined black rice is unique to this land. Shershabadi people are also into farming but on a much smaller scale since they are not the primary land owners and mostly end up cultivating the low lying lands that are flooded by rivers during the monsoon causing extensive damage to standing crops. The need for survival and sustained livelihood led them to “tobacco leaf rolling (the local cigarettes known as Bidi)” as a supplementary occupation.



Figure 6. The indigenously built chimney on the mud wall (Photographs ©Indrajit De & Saumya Pande)



Figure 7. The mud stove and wooden utensil for cooking (Photographs ©Indrajit De & Saumya Pande)



Figure 8. The "Dhenki", an indigenous see-saw like wooden apparatus operated by legs to grind spices kept in the pit dug out on mud floor. The pit is lined with calcium hydroxide for dis-infecting the same (Photographs ©Indrajit De & Saumya Pande)



Figure 9. The age old way of catching and storing fish. The storage cane basket is uniquely designed to have a system of one way –in from top and one way out from below. (Photographs ©Indrajit De & Saumya Pande)



Figure 10. The granaries of various sizes made out of mud and bamboo used for storing grain as well as used as an Almira (wardrobe / cup-board) to store embroidered pieces. On the extreme right is a decorative cup-board made out of mud and clay. (Photographs ©Indrajit De & Saumya Pande)



Figure 11. The use of stone slabs for manual grinding of spices, cereals etc. (Photographs ©Indrajit De & Saumya Pande)

9. Key issues identified

Bidi manufacturing is one of the largest industries in India (Shimkhada and Peabody, 2003). Over 70 million people in India smoke the hand rolled bidi because it is cheaper than the cigarettes (a packet of 15 bidis costs INR 5 as compared to INR 150 for the same number of cigarettes). However, the irony of the situation is that "Bidi rolling" is not even an indigenous industry in Kishanganj.

The raw material required i.e. the Tendu leaves (tobacco leaves) are grown naturally in Orissa. They are supplied to these Shershabadi people by the middlemen to exploit the cheap labour available. The entire Shershabadi families from 5 to 80 year olds, participate in this group activity sharing the work load and earning on an average INR 100 per 1000 bidis rolled. The profit is huge for the middlemen and it is the women of the household who are at the maximum receiving end (over 90% of all the bidi rollers are Shershabadi women). Apart from being exploited for cheap labour with no regard for minimum wages, bidi rolling is a back breaking work with severe long term ophthalmic, respiratory, nervous and gastrointestinal complications. Inspite of the evident health hazards, the practice goes on today in almost all the Shershabadi villages that we came across in Kishanganj.



Figure 12. The Shershabadi women and children involved in bidi rolling process (Photographs ©Indrajit De & Saumya Pande)

The situation is worsened by the fact that migration in this area is being witnessed at two levels; work force migration of Shershabadi community and geographical migration of the two rivers changing their courses, swallowing fertile farm lands of Shershabadi farmers and never allowing the community to settle down at one place.

Even though they are not nomadic, they are forced to be always ready to move, carrying whatever they can, rebuilding their homes after every monsoon flood and slowly losing a sense of belonging to the land. Flood also results in epidemics and other related collateral damages. Lack of awareness, no formal education, poor hygiene and severe poverty increases the impact of natural and man-made disasters many folds.

10. Potential Solution

Our first visit to Kishanganj culminated in the first week of August 2017. We managed to get a dialogue going with the women artisans, commissioned around 15 pieces and did extensive documentation of the craft. By mid-August, due to incessant rain, Kishanganj was flooded and was completely cut off from Indian mainland for nearly 10 days. Standing crops were destroyed, artisan huts were washed away, Indian army was called

in for rescue efforts and people left for dry higher grounds with whatever they could salvage and carry with them.

Two weeks later when we managed to get in touch with the artisans, tears rolled down our eyes; in the hurried escape from the flood water, the Shershabadi women carried the pieces that we commissioned them, continued working on them and braving through such a calamity, managed to finish the embroideries; such is their grit, determination and pride in what they create. This episode also highlighted the importance and potential of embroidered textiles as a mark of identity that is carried along.

"To be born a woman in this complex social colosseum in rural India, is like being born within an allotted and confined space, into the keeping of the men of the community" (Berger, 2008, p.46). It is truly incredible that even in such an embodied existence, the Shershabadi women can visualize a universe of colors, patterns, signs and symbols; a rich and evolved unique visual language. It is said that a woman's presence expresses her own attitude to herself; the undeniable presence of Shershabadi women in each of their Sujni embroidery piece stands testimonial to their indomitable spirit and resilience for life in spite of all the challenges.

Sujni embroidery is not just a textile expression for them; it is a part time engagement, a meditative process and is done out of love and respect for one's skills instead of economic compulsions. No one ever commissioned them, no one ever quilted for a non-family member and no one ever thought of selling the beautiful quilts. The Sujni quilts are like sym-



Figure 14. The Shershabadi women with their embroidered pieces after the flood (Photographs ©Indrajit De & Saumya Pande)

bols of family pride and status, one that can be handed down to the next generation with love and affection; more the mending and age of quilts, more their value in the eyes of the beholder.

Naturally in our attempt to address the issues raised in the earlier section, we want to promote an alternate livelihood based on skilled hands and dignity of work so as to enable these women artisans to give up the bidi rolling profession completely. However, whether the Shershabadi women artisans will take up this part time engagement as a full-fledged profession in place of bidi rolling, was the bigger question in our minds. For them, the Sujni pieces are perhaps an instrument of knowledge but they are also an instrument of possession, a security bond against natural calamities, a blanket in winter and a mattress in summer, a microcosm of all those features that matter to her, all that she is attached to. To think of it as a commercial piece is a huge distance that these artisans need to travel in their own minds.

11. Sujni Embroidery: An Overview of the Process

The term "Sujni" stands for straight running stitches in local dialect. Delicate yet densely patterned, with vibrant colors, the Sujni embroidery is a kind of quilting (the art of stitching layers of fabrics), that has survived the onslaught of time and shares similar origin with another quilting technique, "Kantha" of Bengal. Over the years, however, the Shershabadi community has migrated towards Bihar and developed their quilting technique uniquely avoiding figurative depictions and circular patterns of kantha and sticking to purely geometrical motifs. Generally used as a blanket for new born child or a mattress for the newlywed couple, the textile piece is every bit a work of priceless art as it is a designed product for daily use.

A deep dive into the visual vocabulary of the Shershabadi women points to the reason for using strictly geometric pattern in their quilts. In the absence of an industrialized, mechanized and materialist consumer culture, the women experienced a much more humane growth due to their direct interaction with farming, animal husbandry and natural world. The hand–mind coordination required for paddy cultivation becomes the muscle memory for these women, and gets transferred to the skilled hands engaged in Sujni embroidery. They create motifs using needle and thread mimicking the graphical / geometric patterns of a tilted land, a bamboo forest or rice saplings planted in the knee deep

water. Such is the density and intensity of the embroidery (steps explained below) that one can easily mistake these painstakingly hand embroidered pieces for a beautifully woven piece, convincingly blurring the line between weaving and embroidery.

Step by step Sujni embroidery process explained:

STEP ONE: Choosing the right base fabric and thread for embroidery

Traditionally one or more old cotton sarees of length 5.5 meters each and / or lungi (lower drapes for men) are used as the base fabric. The sarees must be without starch and border. However good quality cotton fabric can also be used for the same purpose. The fabric should be soft enough for the needle to be inserted and long lengths of yarns be pulled together after every four five stitches.

In Kishanganj, the women artisans use acrylic yarn for embroidery making the process faster and the quilt warmer. However, for a more elaborate work, dyed cotton yarns are used.

STEP TWO: Preparing the quilt

Based on the intended end use, the thickness of the quilt is decided and the base fabric is folded and layered. To ensure alignment of the



Figure 15. The artisans selecting fabrics and threads for embroidery (Photographs ©Indrajit De & Saumya Pande)

warp and the weft, the fabric is torn and not cut. The women prepare these layers on the ground in which the feet and the hands are used simultaneously to hold and to embroider.

Traditionally they prefer to quilt on 6 to 8 layers and can easily use a full length sari (5.5 meters) for making an end product of 24 × 24 inch dimension. The folded, layered fabric is further secured with long running stitches. The edges are turned in and finished with hemming.

STEP THREE: Hand sewing the guideline

Once the fabric is ready for quilting, the artisan sews the guiding line at the center of the piece along the direction of the visualized motif to secure the layers. This first line is extremely important because from now onwards all the following lines are embroidered in a calculative fashion with meticulous planning and precision based on the design in mind.

STEP FOUR: The quilting / embroidery

What is extraordinary about this craft is the fact that the visualization of the pattern is calculated in the second line of the stich that follows the



Figure 16. The preparation of the layers for quilting (Photographs ©Indrajit De & Saumya Pande)



Figure 17. Putting the stay stitch in place
(Photographs ©Indrajit De & Saumya Pande)



Figure 18. The Shershabadi women artisans in deep discussion planning the design to be embroidered and working out the mathematics behind it. It is amazing to see the ease with which they calculate, take care of their children on their laps and embroider with precision, all at the same time, November 2017, Arabadi Village. (Photographs ©Indrajit De & Saumya Pande)

first guiding stitch. Though it is not a counted thread embroidery the pattern emerges from the position of the stitch with respect to the previous one.

The Sujni embroidery is traditionally done without the use of any traced pattern or fabric securing frame. It uses no other tool except the needle, thread and "Human hands". The two hands of the artisan work simultaneously in collaboration with each other beautifully complementing and controlling the front and reverse sides of the fabric.

The yarns are counted, the needle is inserted and the thread is secured leaving just the right number of yarns. This process is repeated again and again for thousands of stitches with an automated, almost meditative concentration resulting in a quilt so densely embroidered that it starts looking like a woven piece.

STEP FIVE: The finishing

While each line is embroidered on the fabric, nearly 4 inches of twisted yarn is left both before and after the embroidered line. The extra length of the yarns left at the edges finish the textiles with no further intervention.



Figure 19. The calculated lifting of yarn results in beautiful patterns. (Photographs ©Indrajit De & Saumya Pande)

The knowledge and skills of these Shershabadi women artisans (explained above), reside directly in the senses and muscles, and are directly embedded and encoded in the settings and situations that they go through every day. That's what makes their embroideries testimonials of their lives.

12. Identification of local partner

It is beyond doubt that the Sujni embroidery of Kishanganj is unlike any other forms of Sujni found in other states in terms of motifs, mathematical approach to the process and complete dependency on the local market for the raw materials. In order to ensure a sustainable intervention, we needed a local partner with the knowledge, influence among this community and access to absolute interiors. We collaborated with the local NGO, Azad Foundation (www.azadindia.org) led by the local politician Dr. Jawed Hussain and his wife Ms. Yuman Hussain, working extensively with both the Shershabadi and Surjapuri people for ensuring education, sanitation, healthcare facilities and disaster relief. The collaboration ensured scale



Figure 20. Finishing of the embroidered pieces with tassels is as intuitive as it is beautiful. (Photographs ©Indrajit De & Saumya Pande)

and reach for our project and paved way for reaching the magnificently skilled hands of artisans in the remotest parts of the district.

13. Insights from the field visits and skill mapping workshops

Over the last six months since the initiation of the women empowerment project in Kishanganj, two 3 day long workshops have been conducted with around 20 odd women artisans across 3 villages. The first workshop was focused on understanding the ground realities, potential of the skilled hands and formalizing collaborations at multiple levels; with the artisans, with the local partner representatives as well as with the academic fraternity in Delhi. The extensive documentation helped us in mapping the crafts in the region and benchmarking the skilled hands. The second workshop was designed to focus on identification of artisans willing to experiment, learn, develop products and evolve in the process. The interest amongst the women only grew with time and as the early adopters got their first set of payments for finished embroidery pieces, more artisans enlisted and started attending workshops expecting future work and wages. However, it remains to be seen whether this wave of interest can be sustained in order to dissuade them from bidi rolling. Theinternal discussions, expert consultations and insights from these field visits are constantly being theoretically analyzed and presented at relevant platforms like International Textile Conference in NIFT Delhi, international seminar organized by Textile and Clothing Research Center Delhi etc. bringing out a few exigent questions:

Is the "Sujni embroidery of Shershabadi" inspired by weaving and farming?
Where motifs and patterns emerge out of interlacing of yarns, which is within the fabric; in an embroidery technique the emergence of the motif is on the surface of the fabric. However in case of Sujni of Shershabadi, every inch of the base fabric is embroidered giving it a flat woven look which is akin to how they farm, utilizing every square inch of land for maximum produce.

How is the embroidery vocabulary influenced by local dialect?
The embroidery patterns are heavily influenced by the daily observation, communication, farming activities, and tools used by the women artisans as shown below:



Figure 23. "Biscuit" pattern inspired by a daily commodity (Photographs ©Indrajit De & Saumya Pande)

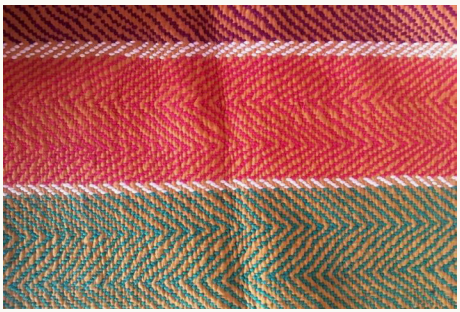


Figure 24. The "Kechul Peeth" pattern of embroidery inspired by the movement of earth worms (Photographs ©Indrajit De & Saumya Pande)



Figure 21. "Leheri or Leher' pattern inspired by the waves in water (Photographs ©Indrajit De & Saumya Pande)



Figure 22. "Lathi" (means stick) pattern inspired by bamboo trees (Photographs ©Indrajit De & Saumya Pande)



Figure 25. The "Kechul Phool Chand" is a hybrid pattern combining inspirations from the movement of earth worms and blooming flowers (Photographs ©Indrajit De & Saumya Pande)

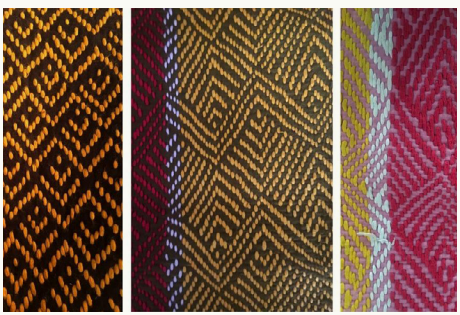


Figure 26. The "Paan Pata" and its variations are inspired by the shape of the beetle leaves. Paan is the local word for beetle leaf (Photographs ©Indrajit De & Saumya Pande)



Figure 27. The "Nau Phool Chand" pattern depicts nine flowers. Nau means nine in local dialect and Phool means flower. Chand means the moon and metaphorically refers to beauty here (Photographs ©Indrajit De & Saumya Pande)



Figure 28. The "Basket" pattern imitates the design of basketry practiced in the region (Photographs ©Indrajit De & Saumya Pande)

What should be the extent of design intervention in promoting this craft?
The regional sensibility of color and patterns that the women wear on their cotton sarees (fortunately polyester hasn't reached their local markets yet) is seen in the contrasting choice of colored yarns that the women embroider with.

The textile lives many lives within one life. Just when the sari is worn off enough to be discarded, the wearer herself breathes in a new life by layering and quilting the same into bed covers, blankets and wraps.

What is the fair wage for the artisans?
Craftsmanship arises from manual skill, training and experience – personal commitment as well as judgement (Pallasma, 2015, p.67). What is the ethical way to value craftsmanship? Should the wage for such expression be based on the hours spent in the embroidery? Should it be based on intricacy of the motifs and number of colors used? Or should the wage be standardized taking into account their present earning from bidi rolling and as mandated by the government?

How to design effective skill development workshops?
The first workshop was conducted in an open courtyard of the village under a banyan tree. Instead of the expected 20 participants, there was the entire village of 150 people; men, women and children alike, who all wanted to be part of this experience. The men were in particular vocal about the money that should be paid to the women artisans for their

work. The Shershabadi women on the other hand were constantly multi-tasking moving organically between workshop, cooking, disciplining their children, sharing a laugh or two about the unfolding drama, showcasing their embroidered quilts reluctantly and demonstrating a few techniques for documentation purpose.

Having learnt from this experience, we came back much more organized the next time and explored three more villages before finally identifying the Arabadi village for sample development. Even then, with the intent to conduct one workshop every two months, a better approach needs to be designed to control the organic situation on the ground.



Figure 29. The skilled artisan Tajkhera Khatoon proudly standing beside her pile of Sujni embroidered textiles. The color of her sari and her embroidered pieces are equally bright and vibrant (Photographs ©Indrajit De & Saumya Pande)

What are the different ways to increase the scale and reach of intervention?
In order to make the efforts more inclusive, skills other than Sujni, need to be identified for example making spices, pickles, organic farming, hand fans making (visuals shown below), basketry etc. The idea is to promote all kinds of craft, cottage industries and agriculture that the women are involved in.



Figure 30. Artisans making the hand fan using bamboo frame, yarns, weaving technique and ruffled finishing (Photographs ©Indrajit De & Saumya Pande)

14. Conclusion

As per David Pye, craftsmanship can be categorized as: “craftsmanship of risk” and “craftsmanship of certainty”. The first attitude means that due to inattention, inexperience or accident the work can be ruined. The second attitude stresses on a predetermined outcome beyond the control of the artisan. Most of the iconic works of art came through the craftsmanship of risk. The risk usually points to the mental uncertainty of walking on unknown, untrodden paths. At this stage of conceiving a social collective in Kishanganj, when questions are many and answers few, one can do little apart from resorting to the craftsmanship of risk, continue to keep believing in the cause; doing, imagining, learning, thinking, seeking, innovating, creating, making and building together with the partners– leaving behind all that divides, opposes and excludes with the unwavering goal of inventing a better tomorrow. What started asa casual discussion between two academicians, is slowly evolving into a collective elaboration and bridging the horizons of urban and rural divide in India. Much remains to be done on the ground though; from raising seed capital to incorporation of the section-8 company, from 20 artisans to reaching the targeted 250 artisans in the next one year. The primary need is the appropriate product development for commercial sustenance and showcasing the work in suitable platforms creating awareness about the breathtakingly beautiful textile expressions bridging the embroidery – weaving gap. With shared perspectives, complimenting expertise, and partners at the grass root level, these designed interventions will enable the Shershabadi women to use individualized expression of quilt making both for personal and commercial purpose catapulting themselves from the background to the much deserved foreground in near future.

Indrajit De
Founder and Principal Investigator,
Zamin Astar Foundation (ZAF), New Delhi, India
indrajit_de2017@pgp.isb.edu

Saumya Pande
Associate professor, Course Leader (fashion design)
Founder (Zamin Astar Foundation),
Indian Institute of Art and Design (IIAD), New Delhi, India
saumya.pande@iiad.edu.in

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Synergetics or Allergetics

Cognitive Strategies of Collaboration in Analogical Design Process

Ozgu O. Hafizoglu

Abstract

Analogy is an essential tool of human cognition that enables connecting two systems with causal relations and essential to learning, to innovation and to discovery. Previous research in analogy has focused primarily on the role of analogy in creative domains. In literature there is lack in understanding different personality type's use of analogy and the way how they think, act and react in a design process and in teamwork. This paper aims to explore and develop how to improve design processes and effective design problem solving strategies by involving different personality types in the various steps of design process. This is a study where cognitive science is applied in design research to improve design process methods.

The study aims to make a contribution to collaboration in analogical design process by investigating the interaction among three factors: personality types, execution of problem solving steps and the creative solutions achieved. An experiment is conducted to understand how designers with different personality types differ from each other in the way they execute each step of a problem solving process for a given design task. Participants took part in the experiment consisting of three tasks: retrieval of source information, mapping, transferring and adapting the whole information selected and evaluating the final solution achieved. In individually executed analogical problem solving process, the possible allergetic and synergetic points of personalities is tried to be revealed.

In this research first we analyzed the relation between personality types and distance of source domains retrieved. Second, we analyzed the relation between personality types and the level of similarity mapped, transferred and adapted to the target domain. Third, we analysed overall relations between personality types, distance of similarity, and depth of analogical thought.

Results showed significant differences among different personality types. One aspect, i.e. the strong need to acquire understanding the behaviours of personalities may present obstacles to the successful execution of stages in analogical transfer process especially to prevent allergetics, but to create synergetics in teamwork. Allergetics and synergetics are both the terms the first of which is used to express dissociation and the second one is used to express association between different personalities for an effective teamwork.

Theme: Actors
Keywords: analogical reasoning, personality types, synergetics, allergetics

1. Introduction

Interdisciplinary knowledge transfer can be characterized as a potential strategy for creativity, originality, novelty and innovation as well. The transfer occurs by taking parallel ideas from other interdisciplinary fields, and altering or seeing alternatives of these ideas to fit them new circumstances. Analogy is considered as an essential tool for the conception of creative ideas (Koestler, 1964; Hesse, 1966; Dunbar, 1999; Hofstadter, 2001) and for the transference of relevant information from the source domains to the target domains (Holyoak & Thagard, 1997).

2. Analogical Transfer

2.1 Parameters of Analogical Transfer

The three main parameters (source domain, target domain and the reasoner) of analogical reasoning is represented in Figure 1.

Analogical problem solving has been studied by many researchers according to different perspectives i.e. how and at what levels analogies can be made. Previous research in analogy has focused primarily on the role of analogy in creative domains (Gentner, 1989; 1999; Smith, 1990).

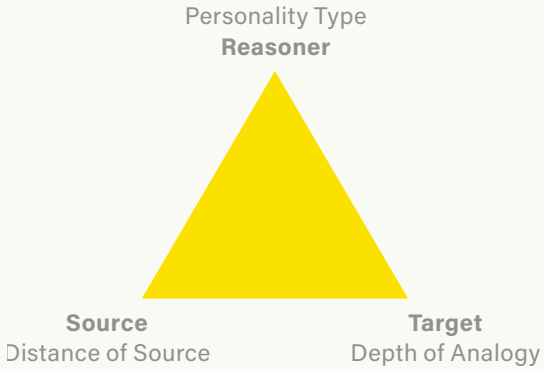


Figure 1. Diagram of analogical reasoning

Some have claimed that the more distant the source and target domains are, the more creative the end product is (Koestler, 1964; Dunbar, 1999). More successful analogies are those which are based on deep structure analogies (Smith, 1990). Some studies reported that the distance of source domain played an important role in the generation of creative designs whereas others claimed expertise of reasoner was important factor in problem structuring and problem representation and use of analogies (Clement, 1988).

Despite, on analogy there are too many studies have been achieved in literature with various aspects, there is still a need for cognitive, qualitative empirical research on analogical reasoning of designers who have different personality threats. In a systematic review of the relevant empirical studies we found an absence of published work on the interplay of personal differences of designers while carrying out analogical reasoning tasks in a design process (Mair et al., 2009). With this motivation for the empirical study reported in the remainder of this paper and with its focus on the identification of hidden potential, the Enneagram typology might provide a powerful tool for design process and talent management. The integrative rather than reductionist approach to personality encourages a more realistic understanding of individual behaviour on the each stage of problem solving. In that respect, we decided to use Enneagram Personality Types.

2.2 Distance of Source Domain

In analogical process, based on their scientific disciplinary relations, the distance between inspirational source domain and target problem domain may change (Dunbar, 1995; Dunbar & Blanchette, 2001). Depending on whether or not the source and the target domain belong to the same subject domain, two types of analogy is defined in literature: between-domain or inter-domain analogy and within-domain analogy or intra-domain analogy (Bonnardel, 2000). From the perspective of cognitive science Dunbar classified analogies as;

- Local;
- Regional;
- Distant (1999).

In this research the terminology of Dunbar will be used. Local source domain represents existing inter-domain solutions of target design problem. Regional source domain represents all inter-domain solutions (artefacts) that lead interdisciplinary information transfers. Finally distant domain represents intra domain sources (nature) which trigger multidisciplinary thinking and information transfers.

2.3 Depth of Analogical Transfer

According to similarity level between source and target, analogy involves at least two distinct forms of relation. At one level, there is a (1) superficial or attributional similarity that involves a recognized correspondence and mere appearance similarity between source domain and target. At another level, there is (2) structural similarity that involves a resemblance of underlying systems of relations within the source and target domains (Gentner, 1983; Rips, 1989; Holyoak & Koh, 1987; Forbus & Gentner, 1995; Novick, 1988). Structural similarities have been understood as the most essential characteristics of analogical reasoning (Gentner & Markman, 1997) since deeper knowledge involves generative central properties of source domains. This kind of information access has a strong influence on the quality of the solutions. Reasoning with deeper structural relations is core of creativity and leads innovative solutions.

	Superficial Similarity	No Superficial Similarity
Deep Structural Similarity	Literal Similarity	Analogy
No Structural Similarity	Mere Appearance Sim.	Anomaly

Table 1. The levels of analogy (Gertner & Markman, 1997)

The levels of analogy thus, can be characterized by matching source domain to target domain with structural properties, or superficial properties, or both as shown in Table 1. These levels of relations are;

- Mere appearance similarity;
- Analogy;
- Literal similarity;
- Anomaly (Gentner, 1983).

In mere-appearance matches, merely the source domain attributes are transferred. In analogy, only deep-structural relations are transferred. In literal similarity, both deep-structural and superficial relations attributes are transferred. In anomaly neither deep-structural nor superficial relations are transferred (Gentner & Markman, 1997).

2.4 Stages of Analogical Transfer

In cognitive science, there is general consensus that analogical transfer involves different sub-processes. These are retrieval, mapping, transfer and adaptation, evaluation, and storage. In idea generation stage retrieval is used, in solution generation stage mapping, transfer and adaptation, evaluation are used. It appears that different sub-processes are affected by different levels of similarity. As a problem solver moves through design stages, relevant similarity shifts from superficial relations to structural ones. Retrieval is accessing a source domain is strongly influenced by superficial similarity. This means that attributional properties attract perceivers in the first glance. Analogical mapping consists of aligning systematicity between source and target and success of mapping is strongly depends on structural similarity. (Keane & Ledgeway & Duff, 1994; Holyoak & Thagard, 1995; Gentner, 1993; Novick & Holyoak, 1991; Schunn & Dunbar, 1996). Transfer and adaptation involves creating new similaritiesand adapting them to target domain. Success of transfer depends critically on the level of structural relation (Holyoak & Koh, 1987; Novick, 1988). Evaluation is improving the achieved solution taking it as the final system model and considering its strengths and weakness (Forbus & Gentner, 1989). It is chiefly influenced by structural similarity and systematicity. Finally, to store for later use, extracting the principle of the final system model seems likely to be governed by structural similarity and systematicity (Keane, 1988).

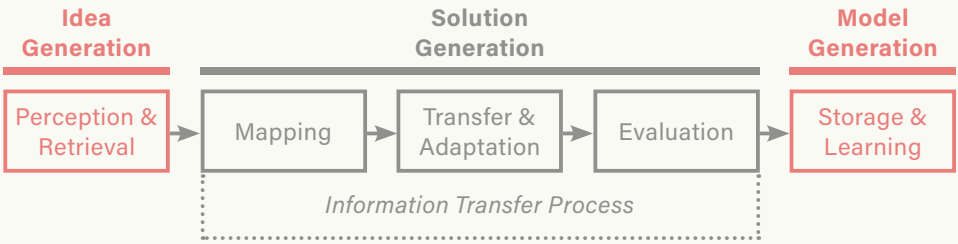


Figure 2. Phases of analogical knowledge transfer

2.5 Personality Characteristics and Analogical Transfer

In literature researchers found that personality type is an important factor to define the social behavior. Riso Hudson stated that understanding our primary center allows us to develop our personal and professional potentials and overcoming our blind spots (Hudson, 2002). There are three centers of intelligence;

- mind centered,
- emotion centered
- action centered.

They combine three more detailed personality types for each center in that triad. Head centered personality combines (5) contemplator, (6) questioner, and (7) optimister, emotion centered personality combines (2) supporter, (3) achiever, and (4) expresser, and action centered personality combines (8) asserter, (9) peacemaker, and (1) perfecter. Each center is characterized by a tendency which deeply influences how you react and how you experience relationships based on the ability to think, to act and to feel (Hudson, 2002; Sutton & Allinson & Williams, 2013).

In this study just the main triad is taken as primary types to clarify their performance in the above mentioned stages of analogical problem solving process. The nine personality types will be explored later in a broader and deeper research.

Based on a distinguishing mark of personalities, we claim that collaborative analogical transfer can be successfully achieved in different stages matching individuals to the appropriate stage of the design process regarding their potentials. With this motivation it is important to understand strengths and weakness of personalities to prevent possible allergetics and develop synergetics with a better role definition in a design process.

All the parameters of this research are summarized in Figure 3.

3. Research Design

The questions of this research were threefold (Figure 4). First, how the remoteness of source domain to target domain retrieval differs in terms of personality types in the idea generation stage. Second, how personality types achieve depth of analogy in solution generation stages of analogical design process. Third, what are the overall relationships of personality

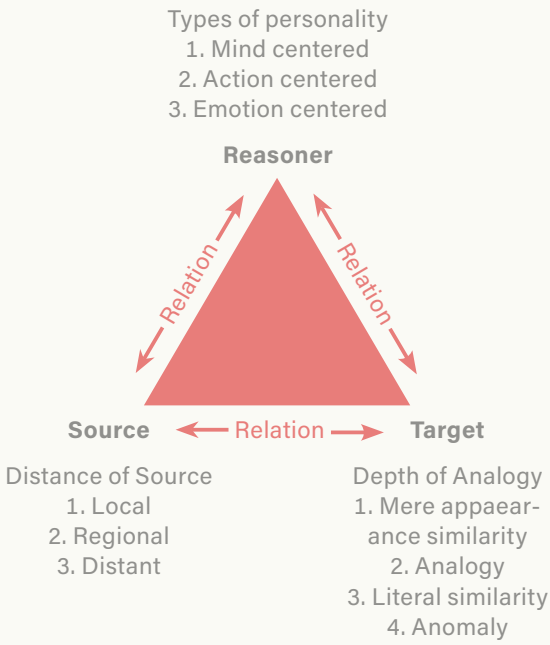


Figure 3. Parameters of analogical problem solving process

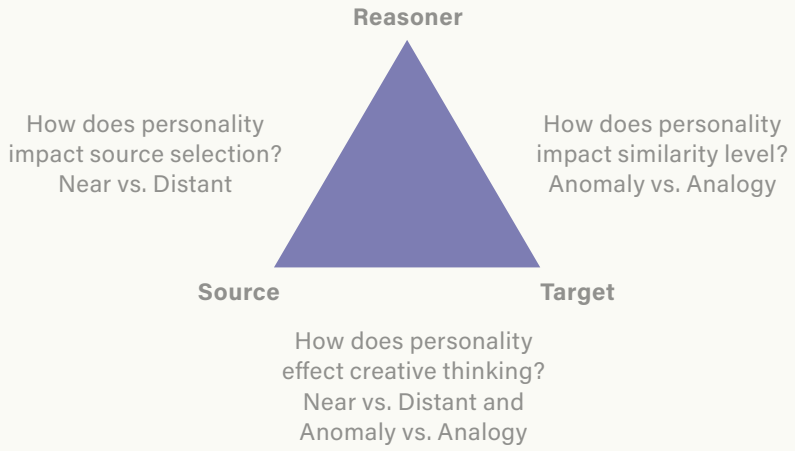


Figure 4. Questions of the research

types, distance of source domain retrieved, and the levels of analogy achieved in the generative stages of analogy process.

The hypotheses are; first, mind centered personalities would tend to establish near domain analogies whereas action centered personalities will tend to establish more distant domain analogies. Second, action centered personalities would more likely establish deep structural similarities whereas mind centered personalities would use superficial similarities. Third, action centered personalities design with more steps in the analogy process. The frequency of design stages would differ depending on the designers' type of personality and their source domain retrieval. Emotion centered personalities would probably behave like both mind and action centered personalities. Briefly, analogical transfer in design is strongly influenced by personality types of designers.

3.1 Participants

152 experimenters completed a questionnaire survey assessing their personality types and their each type was identified. Then participants eliminated to 35 for each type. Out of 105 selected, 96 participants (mind centered n = 31, action centered n = 32, emotion centered n = 33) participated to the experiment.

3.2 Materials

An experimental study is conducted to better understand the interactions of these whole parameters explained above. As target domain experimenters are given a toy design problem. The important point in the selection of problem was the simplicity for all possible experimenters. The source domain groups were defined in four different categories; (1) local, (2) regional, and (3) distant. These are first, toy design examples as *local*, second, examples from industrial design as *regional*, and third, examples from nature as *distant* respectively.

The examples were determined in two phase selection process. In the first phase 240 source examples with 80 examples from each category were identified. Then 80 examples eliminated to 20 for each category. 3 expert designers selected the remaining source examples unanimously with Delphi. With the %87 agreement, 30 source examples were selected by independent judges in two rounds (Table 2).

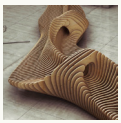
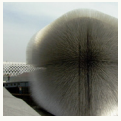
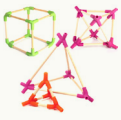
	Local	Regional	Distant
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Table 2. Selected source domain examples

3.3 Procedure

In the experiment, the participants were told to imagine themselves designing a geometry toys which is not so complex for all levels of expertise. Then, they were expected to derive some information from the given source examples, and then apply it to the given design problem. In order to compare and contrast personality types in terms of their use of analogy the experiment was conducted in three tasks: the first task, asking participants to rate a randomly shown 30 source examples as source of information for the given design problem; the second task focused on selecting one of the source domain category with 10 examples in each. From the selected category participants also selected one example out of 10 and explained the reasons of their selections. The third task focused on the toy design by transferring the information from the chosen source example. In the first and second task data were analysed according to analogical distance; (1) local, (2) regional, and (3) distant. In the third task final design solutions of participants were categorized by three judges. The categorization is made according to similarity levels; (1) mere-appearance similarity, (2) analogy, (3) literal similarity, and (4) anomaly. Chi-square test, ANOVA, and MANOVA were conducted to better analyse the relations and differences between these parameters. In order to make a comparison between textual and numerical data collected, experimenters also were asked for the parameters they considered during design process.

3.4 Findings

First Task Results

In this task, participants were expected to rate 30 source examples (1-poor, 2-average, 3-excellent). The results are given in Table 3. Multivariate test (MANOVA) indicates that there was a significant difference among three groups in their rating of source examples (Wilks'Λ=0.076, $F(90, 178)=2.4$, $p<.05$ alpha level) (Table 4).

The results show that action centered designers generally gave high scores to near domain examples, i.e., the group of toy design (59% and excellent rating) and the group of artifacts (44% excellent rating). Mind centered designers generally rated distant domain examples high, i.e., the group of nature (59% excellent rating) and the group of artifacts (44% excellent rating). Emotion centered personalities rated all the groups almost homogenously (Table 3).

	Geometry Toys			Artifacts			Nature		
	MC	AC	EC	MC	AC	EC	MC	AC	EC
1_poor	0.26	0.20	0.28	0.27	0.26	0.29	0.21	0.37	0.46
2_average	0.28	0.21	0.28	0.29	0.30	0.29	0.20	0.26	0.24
3_excellent	0.46	0.59	0.54	0.44	0.44	0.42	0.59	0.36	0.29

Table 3. Personality types and local, regional, distant source domain rating frequency percentage (1–poor, 2–average, 3–excellent). Mind Centered (MC), Action Centered (AC), Emotion Centered (EC).

Multivariate Test						
		Value	F	Hypothesis df	Error df	Sig.
Personality types	Wilks' Lambda	,076	2,397	2	178	,000

Table 4. Multivariate test (MANOVA) results

Second Task Results

In the first task, participants were given randomly ordered source examples. So, they rated them without receiving any information about the categories. In the second task the categories of source examples were clarified. The participants were expected to select one of the three categories (i.e. geometry toys, artefacts, or nature) and one example out of ten within the group.

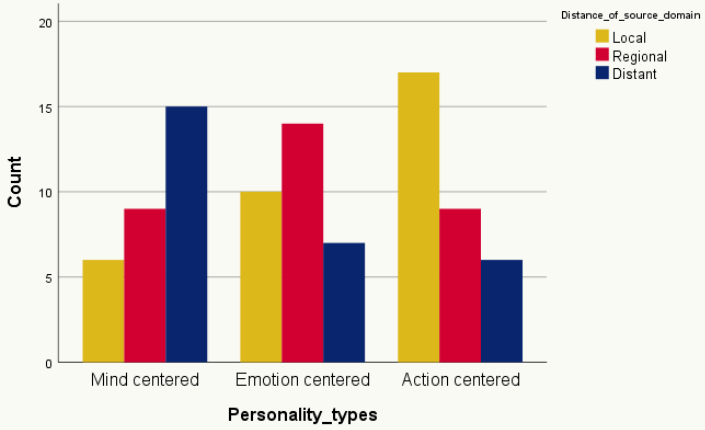


Figure 5. Differences between personality types and local, regional, distant source domain retrieval

Chi Square Test			
	Value	df	Asymp.Sig.(2-ided)
Pearson Chi-Square	34.178	4	,000

Table5. Chi-square test for personality types and distance of source domain relation

Results are given in Figure 5. The frequency results indicate that a difference between personality types and source domain group selection. Mind centered personalities selected the distant domain with 40%. On the contrary, action centered personalities selected the local domain with 52%. The selection differences between emotion centered designers were less than the other two groups. Chi-square test (Table 5) results indicates that there is a significant relationship personality types and distance of source domain parameters; x^2 (4, N=96) = 34.178, p=.000, $p < 0.05$. Briefly, it is clear that group selection and personality type significantly related factors when source domains grouped in the retrieval process.

Findings from the second task are parallel to the first task results. Second task findings show the consistency of the reasoner in their rating procedure. Participants rated the source examples in the first task as if they knew about categories.

In the second task we also asked to the participants the reasons of their selections. This task was a follow-up to the previous one and participants were asked to explain the reasons for their source domain selections. The items of content analysis were mere appearance (formal) characteristics, function, structural relation, causal relation, originality and design process. Approximately 96 answers of questions and approximately 4,000 words of relevant excerpts were transcribed and keywords were color-coded during transcription to facilitate subsequent analysis and collation.

The results are given in frequencies of parameters mentioned as a reason for source domain group selection (Table 6).

Second task textual data revealed that mind centered personalities generally focused on distant domains with the aim of originality, novelty, and creativity; whereas action centered personalities generally focused on near domain in the aim of practicality and productivity. Emotion centered personalities on the other hand considered neither originality nor productivity exclusively. On the contrary, action centered personalities generally considered how to use the source examples in design process and focused on *practicality* and *design process* concepts.

	MC	AC	EC
Mere Appearance	0,98	0,85	0,68
Function	0,73	0,81	0,59
Structural Relation	0,07	0,56	0,50
Causal Relation	0,02	0,20	0,45
Originality	0,41	0,08	0,09
Design Process	0,06	0,24	0,45

Table 6. Parameters generally considered for source domain group selection. Mind Centered (MC), Action Centered (AC), Emotion Centered (EC).

Third Task Results

The descriptive analysis of target domain analogy levels are given in Figure 6.

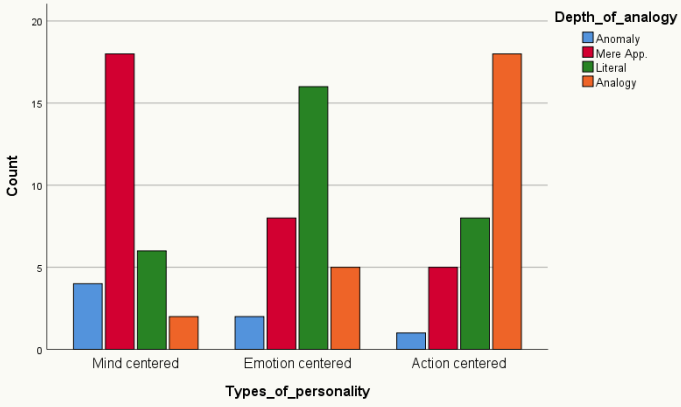


Figure 6. Depth of analogy according to personality types

Chi Square Test			
	Value	df	Asymp.Sig.(2-ided)
Pearson Chi-Square	33.833	6	,000

Table 7. Relation between personality types and analogy levels

Results show that mind centered personalities designers generally transferred mere-appearance knowledge and focused on the attributional characteristics of source domain. They could not make analogical con-

nection with the source example but just pictorial representations. The frequency percentage of mere-appearance similarities made by mind centered personalities designers is 52% which were the highest result in this level. The percentage of anomaly the mind centered personalities is 26%. On the contrary, action centered personalities generally transferred deep-structural knowledge and were able to make analogies. They made analogy with 56%. Emotion centered personalities generally established literal similarity with the source domain with %48. Third task visual data analysis shows that mind centered personalities were better in creative idea generation from distant domains; whereas action centered personalities were better in productive analogical process generation from near domains. Emotion centered personalities transferred generally literal information from regional domains in the thought of that literal transfer from distant domain would not be the solution to the problem, literal transfer of near domain would yield plagiarism, but literal transfer from artefacts will lead to an innovative solution.

Action centered personalities are more successful in perceiving and transferring deep-structural relations with a strong effect on the ability of analogical reasoning in the solution generation process. The descriptive statistics indicate that there is a linear relationship between personality and similarity level. Chi-square test results show that there is a significant relationship between personality types and the levels of analogy; x^2 (6, N=96) = 33.833, p=.000, p<0.05 (Table 7).

Comparing the performance of participants in this study, it is observed that the solution-relevant higher level abstractions and representation of structural features are developed by the action centered personalities. Emotion centered designers generally focused on source objects itself and reasoned generally with literal connections. Action centered designers on the contrary considered the causal relations with a pragmatic approach regarding productivity. They were able to make abstractions at multiple levels discovering the system relations and the main aspects of source examples. Mind centered designer generally reasoned with mere appearance similarities and made lower levels of abstractions. They could only benefit from the superficial object attributes of the source domains.

These analyses reveal that personality types affect the level of analogical transfer. Source domain selection criteria are mainly based on the goal of the reasoner. Similarly, goal of the reasoner also may depend on the personality type. In their explanations often mind centered designers

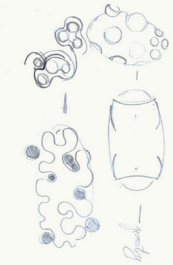
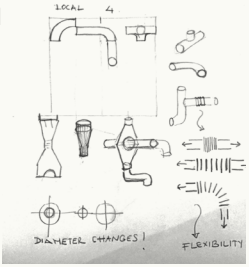
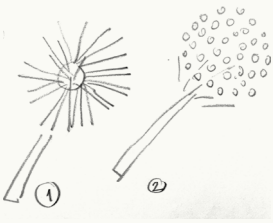
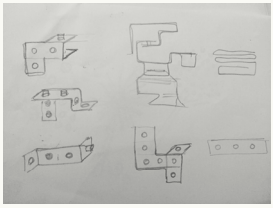
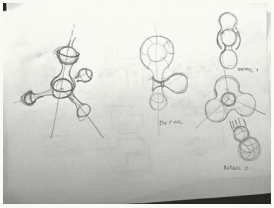
EC Designers_ Mere App._Ditstant (Artifacts_7)	MC Designers_ Literal _Distant (Nature_7)	AC Designers_ Analogy_Local (Toy Design_3_4_5)
		
MC Designers_Mere App. Sim.Distant Domain (Nature_3)	EC Designers_ Literal_Regional (Artefacts_2)	AC Designers_ Analogy_Regional (Nature_10)
		

Table 8. Examples from design solutions

expressed that the geometry toy to be designed should be unique and different, i.e., original, novel, eye catching, pleasing to the eye and aesthetic. They offered nature as a primary source which offers more unique design opportunities. However they mainly focused on superficial characteristics. Action centered designers on the other hand were more concerned about strategizing the design process, i.e., effective design process, productivity, efficiency. Compared to other groups, they are concerned more about how their selections will shape the design process and expected quality of the end product. They generally stated that using near domain examples would ensure the success of the end product since it was closer to the problem in hand.

In the light of the results given above, we could derive the following (Table 9)

Comparision parameters	MC	AC	EC
Level of Similarity	Superficial Similarity	Deep-structure Similarity	One-to-one
Similarity Type	Mere Appearance	Analogy	Literal
Level of Knowledge	Domain Specific	Domain General	Domain Itself
Analogical Reasoning	Formal	Relational/ Causal	Structural
Idea Genaration	Playfull	Rigit	Emotional
Solution Generation	Confused	Masterfull	Use existing solutions
Reasoning Type	Anaytically	Analogically	Abductive
Consideration	Originality	Practicality	Both
Thinking Type	Divergent & Creative	Convergent & Critical	Fixated

Table 9. Comparison of personality types. Mind Centered (MC), Action Centered (AC), Emotion Centered (EC).

3.5 Discussion

On the contrary to our prediction, mind centered designers generally rated randomly given distant source domains with highest scores. Action centered designers on the other hand generally rated local domains with highest scores. Emotion centered designers' source domain group selection differences are less than the others. In the third task, action centered personalities designed with deeper levels of analogies. Experiments results show that mind centered designers are more likely driven by originality, novelty and creativity in their selection of source category to enhance creative solutions. However, they were fixating on the pictorial information and generally focused on the given representation of source examples. They inferred and made pictorial, attributional, or superficial or mere appearance transfers or end up with anomaly. Mind centered designers retrieved original ideas whereas their execution of problem solving steps was not enough to solve the problem. Action centered designers, on the other hand, generally focused on generally focused on productivity and retrieved near source examples but achieved analogical

transfer. Emotion centered designers were between these two cognitive behaviors. They were generally insufficient to perceive higher-level causal relations and generally made literal transfers.

Third task visual data analysis revealed that mind centered designers were better in creative idea generation from distant domains with their *divergent thinking* ability, whereas action centered designers were better in productive analogical process generation from near domains with their *convergent thinking* ability. They also mapped, transferred and adapted the information of source domain, and evaluate the final solution. Emotion centered designers generally used information as it is. It can be suggested that emotion based designers are better in memorizing the information as how it is.

Although mind centered designers generally aimed originality and behaved as a creative thinker in the retrieval stage, they made pictorial transfers with single step processing mode (Hummel & Holyoak, 1997) throughout the solution generation stage. In the idea generation phase, distant analogies are seen as *creative mental leaps*. However, the originality in novel solutions is bound to using new strategies for the execution of problem solving steps (Holyoak & Thagard, 1995 & Ward, 1998), superficial transfer of them leads to incorrect procedures (Novick, 1988). In this experiment action centered designers made deep structural transfers with multi-step processing mode. In the idea generation phase, action centered designers generally selected near domains for the reason that they saw near domains as useful respectfully for practicality. They made analogical transfer with *productive mental hops* (Ward, 1998). Contrary to mind centered designers, action centered designers behaved more as a problem solver in mapping, transferring, adapting, and evaluating stages. Action centered designers were more qualified in goal-oriented strategic thinking (Holyoak & Thagard, 1995), in managing design process regarding the time. They were able to construct the solution generation process with more related multiple sub-stages. Emotion centered designers aimed originality and practicality together. However, they made one-to-one correspondence adapting the source domain to the target domain. They neither succeeded the creative mental leaps (Holyoak & Thagard, 1995), nor worked with effective mental hops (Ward, 1998). They retrieved ideas from regional domain and associated them literally both for the sake of both novelty and practicality as well.

3. Conclusion

Information transfers from distant domains are more likely to be potential for extraordinary creative analogies, thinking with creative mental leaps, and reasoning with creative mental hops. This is just possible by synergetics of designers regarding the potentials of them according to their personalities and being aware of the weaknesses to prevent possible allergetics. Findings lead us to make comparison between personality types in with a view to manage collaboration better.

Creative analogies can be achieved thinking as mind centered designers in idea generation phase, reasoning as action centered designers in solution generation phase and memorizing solutions as the models for any design problem. Effective use of analogy might be the core of the organization of collaborative design process. Creativity in idea generation phase, productivity in the solution generation phase can be developed by systematical and methodological use of analogies by the correctly defined roles. Action centered personalities have the developed ability of analogical knowledge transfer since they presented deeper-structure knowledge transfer, convergent thinking abilities based on their action based life. However they were conditioned in the selection of source domains. In the light of these findings we can conclude that mind centered designers need more productive thinking support from action centered designers whereas action centered designers need more as divergent or support from mind centered designers. With their memorization potentials, emotion based designers can take role as the memory of the team. Collaboration and teamwork, or briefly synergetics rather than allergetics will yield creativity as a result of creative idea generation and effective solution generation and information organization. We can say that collaboration between personality types might yield interesting creative outcomes. Based on the potentials and threats of designers, well defined roles for the design stages, will create synergetics and eliminate allergetics between individuals in collaborative analogical design process.

Ozgu O. Hafizoglu
Ph.D, Cognitive Scientist,
Izmir University of Economics –
Faculty of Fine Arts –
Department of Industrial Design, Turkey
ozgu.ozkan@ieu.edu.tr

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‘Film Cycle’ Project
Video presentation

Takayuki Ikegawa, Osamu Sahara, Atsushi Matsumoto

Theme: Actors
Keywords: media design, design methodology, community archives, personal media, visual design

1. Research Background and Purpose

'Film Cycle' is a design project that aims to make an effective cycle of personal media, using 'old' and personal footage that includes 8mm films and various photos taken in the 20th century. Using digital technology to display these media in a cohesive sequence, personal and collective stories play important roles to establish new media, which weaves next narratives to be shared within and beyond communities. We examined how to preserve and reuse those personal media to contribute to creating a world of empathy.

2. Process and Results

From August 2016, the process of gathering and classifying the personal media within the local community was started, and in the space of half a year, members of the Ikegawa Lab from the Kyoto Institute of Technology and Sahara Lab from Tokushima University, had a chance to experience Kyoto's local community history in town called Ooe.

This project is divided in the following programs:

1. Design of the Education Program for High School Students: Digital coloring of pictures taken in the past

   Through the research process, using black and white photographic plate pictures from the past of Ooe as material, the senior students of the Multimedia Course inquired about the data of the pictures from the photographers themselves, and proceeded to digitally colorize the pictures.

2. Gathering of stories and the design of their sharing space: Community-recorded 8mm film

   In August, the activities related to searching for and verifying the state of the 8mm films in existence within the town of Ooe took place, and from October onwards, with the collaboration of the Town Office of Ooe and NPO remo, a callout for the collection of these 8mm films was announced to the public.

3. Design of Media contents: Yuragwa River Story VR

In this program, using full 360° video recording, the river in its current state was recorded by master's students from the Ikegawa lab Considering the well-known tendency for flooding in the region of Ooe, old footage from previous floods was used as a reference to add CG animation of such an event to the current footage of this river. The result was displayed the result as VR.

In February 2017, a temporary museum was set-up in the studio of Ooe High school, showing the outcomes of the project to the public, focusing especially on the public community of Ooe. Up to 400 people attended this event. Also as a related event, a showing of the collected 8mm films was attended by over 50 people. Unlike a regular showing of media, the event and its venue were designed to allow the attendees a opportunity to talk and share with each other the experiences of the past. Within this museum, the 'new' old media exhibited presented an opportunity for old and new generations to communicate, giving this project constructive arguments to continue collecting and presenting media and their stories in the future.

Takayuki Ikegawa
Associate professor,
Kyoto Institute of Technology, Japan
ikegawa@kit.ac.jp

Osamu Sahara
Associate Professor,
Tokushima University, Japan

Atsushi Matsumoto
Researcher of NPO remo
(record, expression and medium organization)

Teaching Interior Design for Young Children through Participatory Design approach

Ngoc Pham, Trinh Bui, Davide Fassi

Abstract

In the last few years seen the booming of "Design for Change", the platform has witnessed an exploration of innovative skill education, nationally and internationally. It is strongly indicated that creativity, entrepreneurial skills, risk-taking adaptability, innovation capacity, problem-solving, skills related to effective team works and sharing information, knowledge are all be taken into consideration of competitive advantages. In specific with primary education in the Vietnamese context, more than any other level of education, needs to first implement the new approach in innovation-related skills so to prepare for those who will lead the future. The Design Department of National University of Civil Engineering (NUCE) has adopted the Design Educational Program named "Kids Think Design" to answer the call "Doimoi", a government action for Vietnamese education for 2010–2020 in which Design students, educators, and young children work together through the design process. Design education plays the role not only in designing things beautiful or functionality, but also young children can learn many things about creativity and innovation from the design process. Especially in the field of interior design, by using participatory design methods, young children can design better-built environments with a better perspective of their future spaces and learn about natural sciences, mathematics, geography, and model making all at the same time. Additionally, with the contribution of intergenerational groups in the design team, children can be actively involved in the design practices and solve real world problems. This paper will describe a case study in the form of participatory design approach and co-design session. The results of this study will be identified and discussed in four following categories, namely: 1) Adults as facilitators, 2) Fun and balanced relationships, 3) Participatory design methods, and 4) Educational benefits

Theme: Actors
Keywords: participatory design, co-design, interior design, design education

1. Introduction

Based on the Multiple Indicators Cluster Survey 2006 of Vietnam's General Statistics Office (GSO, 2007), the children at the age of primary and secondary school in Vietnam are typically learned with fundamental skills in reading, writing, mathematics, art, geography, history and physical. The program at this level will establish a solid foundation for learning and understanding core areas of knowledge, personal and social development, in preparation for higher education (GSO, 2007). According to Tarim (2016), with the purpose of physically and mentally prepared to learn in primary and secondary school, children need the freedom to be children because it is their natural instinct as children to be physically creative that enhances brain development which improves learning. Stevens (2012) believes that this has all been denied them by those heavy backpacks, the stress and silly homework cause, and the absence of physical activity during and after school. Moreover, there is a lack of sufficient collaboration with entrepreneurial stakeholders in teaching and student's practices and a lack of intergenerational learning. Young people need to be supported with tools, resources and an open environment encouraging experimentation and development of joint projects (EC, 2017).

In the last few years seen the booming of "Design for Change", the platform has witnessed an exploration of innovative skill education, nationally and internationally. It is strongly indicated that, creativity, entrepreneurial skills, risk-taking adaptability and innovation capacity, problem-solving, skills related to effective team works and sharing information, knowledge are all be taken into consideration of competitive advantages (EC, 2017). In specific with primary school education in the Vietnamese context, more than any other level of education, needs to first implement the new approach in innovation-related skills in order to prepare for those who will lead the future (GSO, 2007). This is a big challenge not only for educators but also sharing the responsibility of parents, communities, entrepreneurial stakeholders and policymakers.

The Design Department of National University of Civil Engineering (NUCE) has adopted the Design Educational Program named "Kids Think Design" to answer the call "Doimoi", a government action for Vietnamese education for 2010–2020 in which Design students, educators and young children work together through the design process. Tashiro (2011) indicates that design education plays the role not only in designing things beautiful or functional but also children can learn many things about creativity and innovation from the design process. Especially in the field

of interior design, it is strongly believed that, by using participatory design methods, children can design better-built environments with a better perspective of their future spaces (Butterworth, 2000). Additionally, with the contribution of intergenerational groups in the design team, children can be actively involved in the design practices and solve real-world problems. In this paper, the author will describe a case study in the form of participatory design approach and co-design session for running the "Kids Think Design" program and possible contributions to this project.

2. Participatory Design with Children

The importance of collaboration between children and adults was emphasized and explored by Durin (2002). He strongly believes that children who are unskilled in the design process could be inspired and empowered by their collaboration with adults in order to generate new ideas or looking for better solutions. Moreover, Melonio and Gennari (2013) identified three main benefits for both children and adults when involving in the design process at various stages: 1) gaining a better understanding of people's need and requirements, 2) creating realistic expectations in target groups and 3) marginalized groups are empowered. In this study, participatory design approach was used to run the "Kids Think Design" program in Vietnam and to assess the usability of the intergenerational design team. There are a number of reasons for this selection. First of all, it seems to be so complex and abstract to discuss with children about interior design and design professional. Yoo (2000) showed the distinction between children and adults in terms of developmental characteristics, particularly with respect to short-term memory span, immature languages and difficulties encountered when engaging in highly cognitive processes. Baek and Lee (2008) claimed that children are accustomed to visualizing ideas by drawing, sketching or making things because of these methods of generating ideas are distinctive childhood pastimes. Secondly, participating on collaborative activities with generative tools including visual collages, simple mock-ups and low-tech prototyping will stimulate interest among children and helps them to overcome passive attitudes or shyness and to establish common goals that contain abundant data on cognitive characteristics (Vaajakallio and Mattelmäki, 2007). Finally, with its element of fun, the participatory design approach is less dependent on language and professional skills, while at the same time encouraging children's potential for creativity and imagination (Mazzone et al., 2012).

3. Case Study

3.1. Context and Participants

The study was part of an educational program called “Kids Think Design” and a long-term intervention with a Primary school named CGD (Cong Nghe Giao Duc – Technology and Education) in Hanoi–Vietnam. This connection was made through social relationships and the introduction of some educational experts. An intergenerational Co-design group was built of adults and young children with the slogan of “building little thinkers”. The whole Design team consisted of 30 young children at the age of ten years old from CGD Primary school. Accordingly, the young children at the age of ten were selected for this study because this age is considered to be old enough for participatory design approach but still young enough to think as a child (Guha et. al, 2004). On the other side, the adult groups consisted of core members and project partners. There were 19 fourth-year design students, five third-year undergraduates, five assistants (all from Interior Design Department – NUCE) and the author (leader and observer) participating as core members. The project partners included five primary teachers (CGD Primary school), non-profit organizations and university researchers. All the participants were divided into five groups, that each composed of six children, four students, one class teacher and one design instructor working together in a common project theme: “Re-designing the interior and exterior spaces of the CGD primary school in order to promote creativity and encourage learning attitude of primary pupils”.

3.2. Method

The literature reveals many examples of participatory design with children, especially shows a favour and interest in the field of human-computer interaction and game design, but lacking both knowledge and experiences in the interior design discipline. We still need to examine real-world interactions, and the “Kids Think Design” educational Design program is one of the very first prototype so to unpack this challenge. As a result, we employed the case study method in term of action research with the purpose of examining what engagements and interactions occur in participatory design sessions, conceptualize adult-child partnerships and develop a framework of teaching interior design for young children.

3.3. Data collection

The study was conducted through one-day planning, 3 co-design sessions in three different workshops and a one-day indoor exhibition, placed at CGD Primary school in Hanoi–Vietnam. Each session lasted for about from 2 to 4 hours and was allowed to use the camera to record all the design progress and adult-child interactions. The researchers observed the on-filed co-design sessions, photographed the activities and collected artifacts, then wrote analytical memos for each session. The author (primary observer) read the memos again, watched the video recorded carefully and took notes on the interactions between adults and young children. After that, design assistants (secondary observer) checked other working diaries, watched the same videos and added to the primary observer's notes.

All the sessions of this project took place in summer 2017 before the official school year begins and consisted of the following procedure.

3.3. Procedure

Day 1 – Planning for Participatory Design sessions (10/08/2017) placed at NUCE. Time: 8h30 – 12h30. Two Primary school teachers involved in the project were invited to the Design Studio Lab at NUCE to discuss with student groups on the detailed plan for upcoming Participatory Design sessions. In this meeting, an introduction of the CGD Primary School was presented by two teachers through PowerPoint. The presentation displayed not only learning activities but also a wide range of creative activities such as fashion design, classroom, and school campus decoration. Furthermore, the two primary school teachers also presented their experiences and skills of interacting with children as well as the way to capture the psychology of young children so to build empathy, gaining trust, stimulating interest and creating cohesion. Then, they worked together with Design students to identify the best methods to make acquaintances with young children. Five groups presented five ideas on designing the warm-up game and then selected the most appropriate one in order to satisfy the requirements of time, creativity and objectives. The last part of the planning day was to finalize a list of interview questions for young children based on psychological and pedagogical approaches.

Day 2 – Coming together (15/08/2017) placed at CGD Primary school. Time: 8h – 12h. The first day of the co-design session with young children was started with a playful game named "quick sticky-notes". A series of words

in Vietnamese or English was written on the sticky notes and handed to the young children. Within two minutes, the player had to quickly pick up his notes and find out the words similar to those on the paper which were attached to the students' body. Although the welcoming game did not seem to be related to the design work, the purpose of this game was to sweep away the embarrassment of the young children, creating a fun and friendly atmosphere. After the warm-up game, young children were divided into five groups corresponding to five groups of students, becoming 5 intergenerational Design teams. Firstly, Design students introduced to young children the topic of the project, activities involved and expected outcomes. Secondly, all participants visited the school to explore the surrounding campus. In parallel with the on-site investigation, the groups of students also conducted the interview with young children who played the role of both main users and co-designers. For example, group 1 chose to ask some unrelated and easy questions first to make the interviewees feel more comfortable, such as: "What is your favourite singer? What is your favourite food? Or what subject do you hate the most?" After warming up with some kick-off questions, the interview went directly to the main point by focusing on young children's desires to change their interior spaces and surrounding environment with the purpose of improving creativity and learning attitude. All the information and data were documented by capturing direct quotes as saying by children rather than interpreting what they are talking.

The spaces investigation and interviews were conducted in 30 minutes. After that, all groups returned to the classroom to start their group work. The young children were asked to draw back from their memories the surrounding campus that they had just visited – Figure 1. They were also requested to color what they particularly liked and not color what they disliked. Subsequently, each individual of the group presented his/her drawings including: location of works, special spaces, spaces to be changed, learning and entertainment activities based on his/her unlimited and creative imagination. Other members of the group jointly voted for the best idea based on established criteria such as: creativity, fascinating and feasibility so that the selected idea was developed in the next stage.

Day 3 – Design activities (22/08/2017) placed at CGD Primary school. Time: 8h15 – 10h30. The second working day was divided into two steps. At the first step, the team leader summarized the entire work of the previous



Figure 1. The young children were asked to draw back from their memories the surrounding campus that they had just visited

working day and highlighted the activities and methods employed for the next task. The groups visited selected sites for conducting space analysis and take a snapshot of the status quo. Under the guidance of the students, young children were allowed to directly use measuring tools such as tape measure, laser measure, paper, pen, and camera to measure and record necessary dimensions of walls, floors, columns, windows and daily basis items such as desks, chairs and tables. After that, the necessary parameters were collected consisted of the plans, facades and sections were drawn with a full note of the size. These drawings were then copied in many versions.

The second step was to generate ideas in which a variety of participatory design methods were selected according to specific circumstances. For example, team 4 might use the "storyboarding" method to render animated games that have been practiced or seen in the media. Then, placing these game in various scenarios such as on beaches, in forests, in mountains or on the sand with the increasing level of difficulty. Afterward, all personal drawings were collected together to discuss and find out new more interesting games by combining randomly two or three existing games. Team 1 and Team 3 were divided into smaller groups or subgroup. The members of each subgroup included two young children and one student that implemented the "collage" method – Figure 2. The subgroups selected and cut the images prepared by the students and then pasted these images on the most appropriate position of the newly measured drawings. After that, the subgroup gathered presented their ideas and discussed so to choose only one plan for building the 3D prototype.



Figure 2. The "collage" method that young children selected and cut the images prepared by the students and then pasted on the most appropriate position of the newly measured drawings.

Day 4 – 3D Prototyping (29/08/2017) placed at CGD Primary school. Time: 8h15 – 10h30. In this session, 3D prototyping was the main method used by all Design teams. 3D modelling was quite time-consuming so that the student groups had prepared one or two sets of frames to make sure the task completed on time. In addition, young children were also handed the toolbox including necessary materials and tools such as knives, scissors, colour paper, cardboard boxes, etc. Interestingly, some new ideas may be also found and developed in the 3D prototyping session. To illustrate, the little designers of team 3 have added quite a lot of new features to the Art room instead of the existing ideas generated last week such as: large walls running along the Art room are free to write and draw on; or there is a space for woodworking, crafts, sewing and handmade items. Furthermore, one child of this group had the creative idea of creating a special corner called "spider spaces" where anybody could hang himself in the air, creating a sense of adventure and amusement. The team 2 "Music land" designed and made their own musical instruments with cheap and simple materials such as cardboard, colourful straws, etc. – Figure 3. Some of the young children researched and made by themselves several types of sound self-emitted models.

The 3D prototyping session ended after more than two hours and all Design teams almost completed more than 90 percent of their work-



Figure 3. Team 2 "Music Land" designed and made their own musical instruments with cheap and simple materials.

load. The teams put altogether their models in the middle of the class to begin the presentation session. The principal and teachers of administration board also attended in this activity. Each team nominated one child to make a presentation and then finalized these according to the comments and suggestions of the audiences before demonstrating their ideas to their parents and other stakeholders in the exhibition taking place on the opening day of new school year.

Day 5 – Indoor exhibition (05/09/2017) placed at CGD Primary school. Time: 9h – 11h. The exhibition integrated in the opening day of the new school year on September 5th, 2017, as part of the program of introducing extracurricular innovative activities of the CGD Primary school. The participants attending this event included lots of parents, representatives from the Ministry of Education and all teachers of the CGD Primary school. The exhibition was prepared on the previous day, using cardboard boxes as the main frame for decoration. Each team selected its own key colors in order to easily distinguish from other and making attention. The exhibition show was held from 9 am to 12 pm, including a range of activities, such as introduction section, presentation section and getting the consultation from parents and relevant stakeholders. The exhibition was regarded as an official closing event of the Program "Kids Think Design" in the first season.

4. Results and Discussions

All the Design progress was allowed to capture by photography and video recording due to an agreement and ethics on privacy and security issues. Through on-field observation, video review and focus group discussion, the findings of the program were qualitatively analysed and evaluated, and the framework of the design educational program was initially described in four following categories, namely: 1) Adults as facilitators, 2) Fun and balanced relationships, 3) Participatory design methods and 4) Educational benefits.

4.1. Adults as facilitators

The main goal of the program is to encourage the involvement of children in full stages of the design process, however, it is observed that the success of the whole project and fluency of the participatory design progress firstly depends on the role of adults (Design students, instructors, teachers, and researchers) as facilitators which divided into three corresponding roles when designing interior spaces with children. In this particular case study, each adult's role is the complement to each child's role:
1) when children are learners, adults will be interpreters and organizers,
2) when children are users, adults will be researchers and observers,
3) when children are designers, adults will be design partners.

The first role that the adults served as the "interpreter" concerning the translation of the professional design knowledge into the language that is the most intelligible and most closely related to children's everyday life. In order to involve the children in the design of a specific topic, the interpreter have to carefully check with the teachers whether or not the design theme is appropriate for the selected group of children to work on, or looking for other more suitable groups, or need to modify the current topic to the assigned group. Instead of using professional concepts related to interior design, the students presented in simple and straightforward language, for example, "Let's Design your dream school". Moreover, it is essential for adults to organize and manage the flow of the design sessions such as brainstorming, storytelling, co-designing and 3D prototyping in terms of duration of tasks, activities, breaks, unexpected events, and should facilitate all the group members to contribute to the process equally. When children are users, the adults play the role of researchers and observers. By using a variety of research methods based on anthropology and educational psychology, adults attempt to deeply un-

derstand how children as users react on their existing spaces and what it says about their interests, hobbies, routines and unforeseen desires. Finally, when children walk in the shoes of a designer, adults can take on the role of design partners. Throughout the entire process of interior design, adults and children work with each other as equal stakeholders. The process was implemented via co-design session that the adults were briefed beforehand to allow the children to generate as many ideas as possible and support these by constructivist advice instead of deciding the final solution for them. By considering the voice of children in the design process, the whole group may come up with unimaginable ideas which contribute to the innovativeness of the resulting designs (Hagen et al., 2012).

4.2. Fun and balanced relationships

"Fun" is the first word that comes out from the interview of children when they were asked about their feeling of the project. On the other hand, the children considered each task to be a form of play, not work. It is observed that "fun" plays an important part in keeping children stay focused on the schedule. As a result, all three co-design sessions began with snack time and paper gaming (15 minutes), in which children and adults ate and interacted with each other. Moreover, at the end of each session, group members usually took a selfie and together played some art game such as "animal drawing" and "tattoo on hand". Besides the environment of "fun", it is indicated that balanced relationships are a necessary component in the participatory design process. The findings also revealed two types of social interaction between adult-child that lead toward more balanced co-design partnerships. Firstly, it is observed that children and adults showed no boundary of age and distance by acting "silly" together outside of the design sessions. For example, adults did not only build a warm-up game for children but also involved directly in the game and expressed their emotions when winning or losing like a child. These unplanned interactions that cause children to feel more comfortable around adults and break away from traditional adult-child power structures. The second type of social interaction was shown as the strong appreciation and respect between adults and children during the co-design sessions, especially in the ideation phase when they generated and mixed ideas together.

4.3. Participatory design methods

The results of the described actions were often influenced not only by the atmosphere of the team but also by the type of methods and toolkits using for different purposes, activities and the size of groups. A different and mixture of methods for involving children in the design process have been identified in the literature of both Product Design and Human-Computer Interaction (Hagen et al., 2012). However, within the interior design discipline, there is lack of specific methods that can be used for dealing with children at different stages of the design process. As a result, this case study will not present any new techniques but focus on available generative and formative methods that creating the environment where children are actively encouraged to be creative, selective and critical. Although these methods used by the groups were not necessarily the same or even slightly different from the original, they all concentrated on the importance of implementing collaborative work in all stages of the design process. Particularly, in the inspiration phase in which the purpose of discovering emotions, requirements, ideal situations are an essential part of user research, "Contextual Inquiry" is considered to be the most appropriate technique. It is a method developed by Druin (1998) with the purpose of conducting an on-field interview with users in the workplace. In this experiment, children played the role of users but also acted as the "school tour guide" in order to share, discuss and develop an interpretation of the common work. All the data were collected in the form of pictures and sketches. The ideation phase demonstrated the design's dynamics when design teams have chosen different methods and techniques so to make their participation interesting and enjoyable. For example, group 1 and 3 used generative methods called "Collages" that support children to create ideas through choosing images from a large set of visual stimuli and this activity bring out discussion of the intangible feelings and emotions (Melonio and Gennari, 2013). The other groups have chosen their own approaches by the combination of distinct methods such as, "Storyboarding" and "Mixing ideas", "Sticky notes" and "Bags of stuff". In the implementation phase, it is explored that, the idea and concept continue to evolve in the "making" activities. In fact, the children did not build exactly what they thought or sketched but were continually shaping their idea via physically doing and making it – Figure 4. Obviously, some children found much more interested in prototyping than drawing or sketching and expressed themselves more clearly through form and function than through dialogue. Additionally, the chil-



Figure 4. Making a prototype of a "ZooLab" where children can play with and learn from diverse kinds of animals, such as, how to feed the animal and how to take care of them.

dren who had difficulties in the ideation phase discovered more elements and details needed when making 3D prototypes. This is the moment when all the participants became aligned around the common idea and allowed their innovation to be presented in a more complex fashion (Beamer, Conkic, and Sallaerts, 2017). With all these methods, children are no longer passive responders to interior design buy rather active designers in the process (Arnold, Lee, and Yip, 2013).

4.4. Educational benefits

These are indeed a number of educational benefits that the program "Kids Think Design" could offer to both children and adults. Firstly, from the side of children, through hands-on experience, they are able to observe and reflect on design fundamentals and learn about the relationship between the human spaces and nature, light, and shadow, colours and materials, scale and proportion, etc. Children get acquainted with analysing the spatial experience and examining interior elements by measuring the dimensions of all major aspects of their own classrooms such as doors, windows, and furniture. While performing the design tasks, children learn how interior designers work, how to generate ideas and how to present concepts to others by drawing themselves. This project utilized a wide range of participatory design methods but emphasized 3D prototyping, which has proved to be very effective in learning so to understand the spatial creation. By building miniature models, children can make discoveries by themselves instead of being given answers

by adults. Moreover, working in the intergenerational team stimulates competition and cooperation between children and helps them to develop social and entrepreneurial skills.

Secondly, as looking from the perspective of adults that are mostly groups of fourth-year interior design students, they can significantly benefit and learn from involving children as expert users in cooperative design sessions. It is obvious that the way children see the world is completely different to adults, both physically and metaphorically (Druin, 1999). By cooperating and co-designing with children, interior design students do not only benefit from gaining unique insights of user's perceptions, inspiration, and needs (Arnold, 2019). It could also be an effective way to achieve valuable knowledge in terms of how to address a problem in an innovative approach and improve the designer's creativity (Hagen et al., 2012). It is evident that, children tend to approach their works through curiously, rich imagination, and less restricted by reality, and doing in a surprising way that adults themselves may have never thought of (Hagen et al., 2012). For example, the project shows the unique idea which is never existed within the primary schools in Vietnam. This is the design of the "Zoo Lab" created by group 5, where children can play with and learn from diverse kinds of animals, such as, how to feed the animal and how to take care of them. Actually, this concept does go beyond the traditional interior design and closely related to the emerging design discipline called service design. Furthermore, within the "Kids Think Design" program, interior design students from NUCE needed to work through a multidisciplinary profession, so they had to take into account different fields of expertise, including anthropology, sociology and especially pedagogical skills (Hagen et al., 2013).

5. Conclusion

To be concluded, our project has created an innovative educational program and collaborative learning environment in which both children and adults are working together in the interior design process. Applying participatory design methods allows adults to listen to children's stories behind their creations of imaginable spaces while primary pupils are no longer passive responders to interior design but rather become active designers in the process. Through hands-on experience, children are able to observe and reflect on the built environment and spatial design and learn about natural sciences, mathematics, geography, and model mak-

ing all at the same time. Although the “Kids Think Design” program tends to first focus on the important role of children and educational benefits for primary level, the adults as design students are not an invisible partner to be ignored and even seen as a key instrument to how the partnerships run (Yip et al., 2017). It is strongly believed that the comprehensive model of adult-child relationship (learners – interpreters/ organizers, users – researchers/ observers and design partners – design partners) contributes to the field of interior design and provides a clear framework for researchers to examine equitable practices in the participatory design discipline.

Ngoc Pham
PhD candidate at Politecnico di Milano – Italy,
Lecturer at Faculty of Architecture and Planning –
National University of Civil Engineering – Vietnam
ngocphamtu86@gmail.com

Trinh Bui
PhD candidate at Politecnico di Milano – Italy,
Lecturer at University of Industrial Fine Arts – Vietnam –
Fashion Design department

Davide Fassi
Associate professor at Politecnico di Milano –
Italy Visiting professor at Tongji University – China

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Collaborative Making in Craft and Virtual Reality

Nithikul Nimkulrat, Aaron Oussoren,
Keith Doyle, Hélène Day Fraser

Abstract

This paper examines a collaborative practice of an analogue and a digital craft practitioner developed at Emily Carr University of Art + Design in Canada. Its aim is to illuminate ways in which craft making and hand-crafted objects can be translated using 3D modeling technology and addresses the following questions: (a) What forms of knowing and meaning making are evolving through collaborative practice? How does this inform research creation at an Art + Design University?; (b) What does it mean to manipulate material in Computer Aided Design (CAD) through Virtual Reality (VR)? What are the explicit implications of doing so and how does this inform analogue material practice and experimentation?; and (c) What are the pedagogical implications of this mixed analogue/digital workflow and practice? Originating with a hand-knotted object, the study began with the transformation of this analogue form into digital form using a range of techniques. These activities act as both a survey of digital fabrication capabilities and a way of exploring new thinking mechanisms offered by this emerging form of practice. The study seeks to broaden our understanding of the maker's role within the capabilities and limitations of digital interface and fabrication. Throughout this collaborative practice, each iteration of digitally-fabricated objects was documented and reflection was made on both the outcomes and the ways in which the analogue and the digital craft practitioners work together. This emerging collaborative practice acts as a catalyst for established disciplines within art and design to collide and interact. Outcomes of this study include mapping new workflows within digital/analogue material practice, and reflection on how the materials and methods used in digital fabrication have the potential to expand the meanings connected to the things that are produced. The study also reveals a few provocations impacting the uptake of CAD and 3D modeling skills in the classroom, through collaborative, interdisciplinary practice.

Theme: Actors
Keywords: CAD, collaborative practice, digital fabrication, new craft, virtual reality

1. Introduction: CAD and digital manufacture in craft practice

Technology and "machine culture" have a close association with ideas of precision, reproducibility, and certainty; CAD environments generally reinforce these qualities because their platforms have often been developed for industrial design and mechanized output. The promise of direct digital manufacture has reintroduced questions about the role of the hand in mechanized production. Ruskin's spirit has re-emerged. The conversation has matured since Sennett's (2008) observations that:

> As machine culture matured, the craftsman in the nineteenth century appeared ever less a mediator and ever more an enemy of the machine. Now, against the rigorous perfection of the machine, the craftsman became an emblem of human individuality, this emblem composed concretely by the positive value placed on variations, flaws, and irregularities in handwork. (p. 84)

Writing in different times, Sennett and Ruskin offer up similar perspectives on handwork. They advocate for handwork as a necessary means of production but also note its demise due to automation, its shift in location and connection to personal identity and political outlook. Craft practices using traditional materials and handwork often emphasize experimentation and discovery over output and production. The ideas that arise through use of materials and processes are one of craft's great assets. They serve to augment and are as valuable as the intentions each practitioner brings to a project. Craft practitioners' sapient and adept manipulation of materials is an excellent entry point and a potent means for reconsidering digital manufacturing frameworks. Here the relationship with an artefact is understood as a continuous ongoing set of relations. Translated to rendering a model in CAD, the hand and the digital tool, be it a mouse, a stylus, or other, are implicit to the outcome. The conundrum to this, as pointed out by Nitsche, Zwaan, Quitmeyer, Nam, and Farina (2014, p. 720), is that "Craft requires proximity and skill with physical materials, whilst the digital inaugurates a completely new spatial logic."

While digital fabrication and open source tutorials on 3D modeling have transformed the practice of some designer-makers, other skilled craft practitioners seeking direct interaction with materials through handwork do not see digital interfaces as affording supportive arenas for their creativity. This paper aims to illuminate ways in which craft making

and hand-crafted objects can be translated using 3D modeling and virtual-reality technology through collaborative practice, addressing the following questions:

- What forms of knowing and meaning making are evolving through collaborative practice? How does this inform research creation at an Art + Design University?
- What does it mean to manipulate material in Computer Aided Design (CAD) through Virtual Reality (VR)? What are the explicit implications of doing so and how does this inform analogue material practice and experimentation?
- What are the pedagogical implications of this mixed analogue/digital workflow and practice?

The collaboration exemplified in this paper took place at Emily Carr University of Art + Design over the course of 2.5 months, between Nithikul Nimkulrat in her role as Designer in Residence, and Aaron Oussoren in his role as Affiliated Researcher with the University's Material Matters Research Centre. Each collaborator brought different skills to the project. Nimkulrat has worked extensively in textiles; her practice mixes experimental and traditional forms of knotting to produce evocative art installations. Oussoren works fluently in CAD and 3D printing processes, and applies this to an expansive understanding of glassworking methods as well as mould making for ceramics. These varied skill sets provided some tools and starting points to develop and expand upon the use of digital manufacturing methods related to traditional materials. The following sections will examine a collaborative project using digital tools to evolve a form through paper string, knots, 3D scanning, CAD, Virtual Reality, and 3D printing. Reflection on this collaboration is expected to shed light on how shared interdisciplinary making can contribute to the development of individual collaborator's methods of making and subsequent creative output.

2. Hand crafting through 3D scanning and CAD modelling

Intent on understanding digital processes through a craft lens, Nimkulrat used her long-standing craft knot technique to construct a small artefact for further experimentation with digital tools available in the Mixed Real-

ity and Digital Fabrication research labs at the University. The hand-knotted object was made in the form of a coffee cup and saucer (Figure 1), a replica of *The Coffee Cup* in Nimkulrat's installation *Paper World* (2007) (Figure 2) connected to her practice-led doctoral research *Paperness* (Nimkulrat, 2009). The new form transforms and moves from analogue to digital form using a range of techniques.

Nimkulrat and Oussoren first 3D-scanned the knotted artefact using a high definition Polhemus 3D laser scanner. They envisaged this as a means to translate the analogue artefact into a digital format suitable for manipulation in CAD and 3D fabrication in the labs (Figure 3). The first



Figure 1. Process: the making of the coffee cup and saucer.



Figure 2. The Coffee Cup in the Paper World (2007) installation.

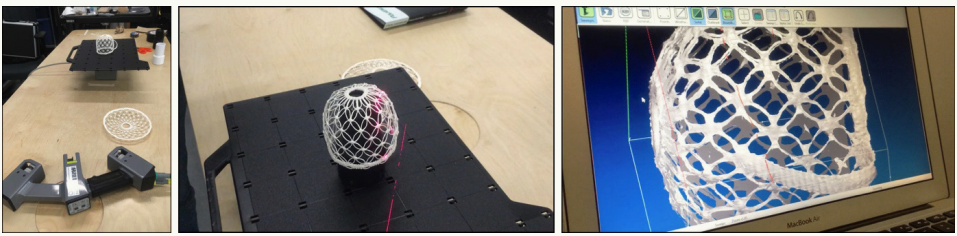


Figure 3. Polhemus Scorpion handheld 3d laser scanner; the scanning process; and the 3D scan.

scanning attempt was carried out with reservation. Curiosity as to how well the intricate details of the knot structure and 0.8mm-diameter paper string could be captured drove the process. Scanning required the movement of the hand in coordination with the eye focusing on the rows and columns of knots. Scans of the cup, although missing details, showed a line quality that resembled the characteristic of paper string and the "handmade." The generated scanned files, however, were too large to process effectively in CAD and crashed both the University's and the hardware manufacturer's computers. The incompatibility between the craft object and the technology were revealed; the properties and characteristics of the craft object were beyond the capacity of the digital tools.

The next approach involved freehand drawing on a photograph of the hand-knotted cup. Using this method a simplified model was produced that avoided the complexity and unmanageable amount of data generated by the previous high-resolution laser 3D scan. A photograph, serving as a template, was imported into the CAD software. This image was then displayed on a WACOM tablet and traced with a stylus (Figure 4). Handling a digital tool to interact with the CAD program resonates with Malafouris's (2013) "Extended Mind" hypothesis. In this case, the mind extends to the virtual software and the body (hand) to the digital tool and machine. One section of the knotted pattern was constructed.

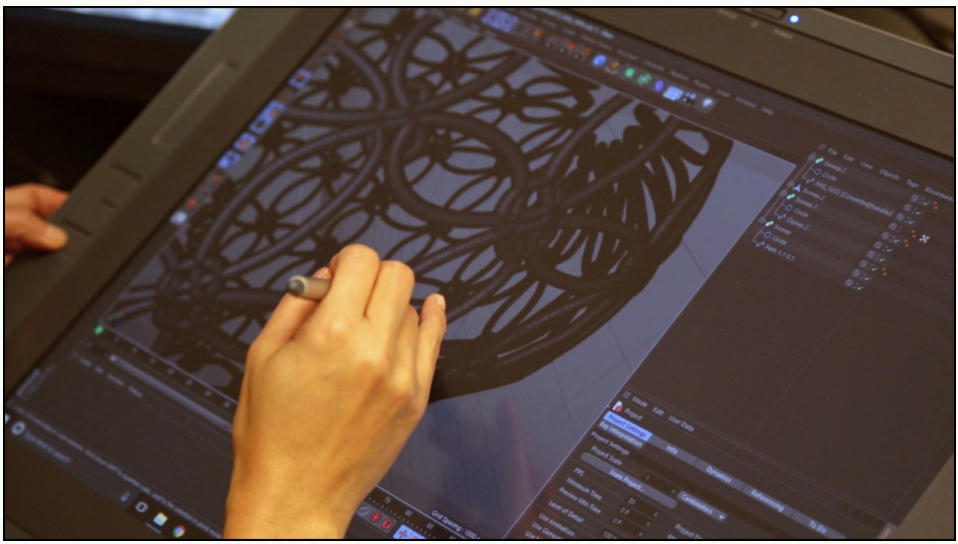


Figure 4. Working on WACOM tablet using a stylus.

A three-dimensional array of this pattern allowed the collaborators to achieve a likeness of the original knotted cup (Figure 5). The resulting watertight model (Figure 6) was suitable for use on a variety of output platforms including 3D printing in plastic filament and plastic composites, and 3D printing in plaster for the moulding of slip-cast porcelain. It is worth noting that throughout the process of developing the CAD model of the cup, communication between Nimkulrat and Oussoren was key. Experts in their respective fields but having limited skills and knowledge in each other's domain, they had to continually find ways to understand intention and speculate on next steps in the process, e.g., through a demo, drawing, etc.

The translation of the knotted form into digital model presented an opportunity to explore the limits of laser 3D scanning and creatively explore CAD modelling. Out of necessity, the starting material, string, needed to be worked with according to prescribed material parameters and capabilities – things that string does well (flex, self-friction, knot, bend). In a similar sense, the digital model was developed according to the parameters of the CAD software. Objects produced in CAD have been described as being trapped in a predetermined visual language, based on things that CAD does well, like skew, duplicate, scale, rotate. The work, to this point, was a record of material manipulation according to analogue parameters, translated into a prescriptive CAD language. The collaborators began to ask: Can the idea of responding to the limitations of a material, to loose threads, cracks, and stiff knots, translate into virtual space? The next section describes the 3D printing process and the resulting prints of the CAD model in Figure 6.

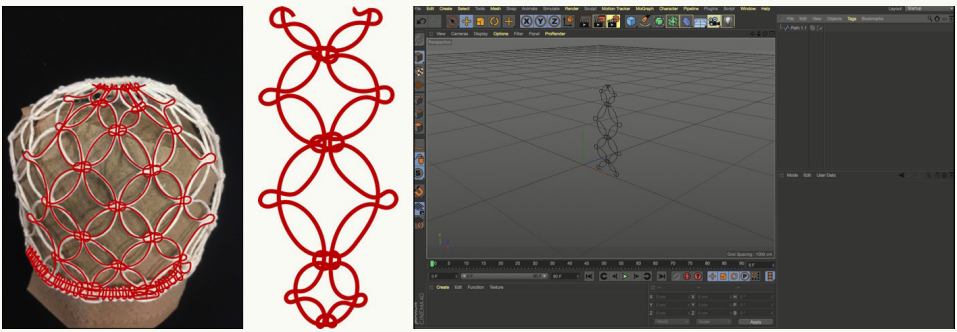


Figure 5. Tracing the knot structure with a stylus and a section of knots imported to Cinema 4D for generating a three-dimensional array of this knot pattern, forming a likeness of the original knotted cup.

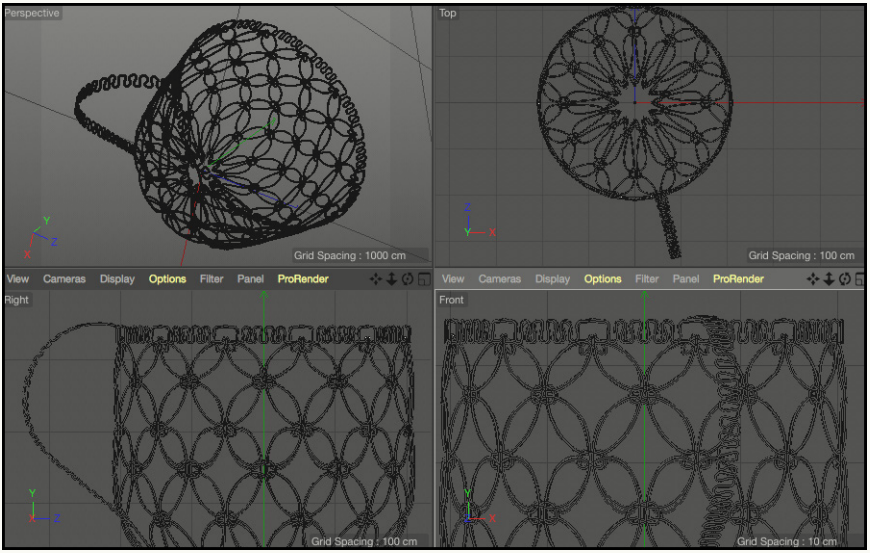


Figure 6. The resulting 3D model of the cup.

3. 3D Printing with filament: Uncertainty and imprecision of digital fabrication

Material manipulation in virtual space opens up the opportunity to deepen our understanding of the potential expression and poetics of mixed analogue/digital production. Seelig (1992/2009) describes this experimental dialogue with materials as central to a creative practice, saying:

> To make form that responds only to a material's physical properties – to what it can do rather than [what] it encourages us to do – more often produces results that are predictable and familiar. The artist's ability to discover qualities in materials that go beyond their scientific properties will provoke form with a far more convincing sense of expression. ... Materials contain clues that allow usto discover our own personal sense of reality through a subconscious process, an intuitive, creative process in which material is an active partner. (p. 55)

Seelig's (1992/2009) conception of responding to materials in terms of "what they encourage us to do" and consideration of material as an "active partner" seems well suited to both crafting a physical object by hand and working with digital content. The development of the model in CAD

had required many hours navigating the restrictions of the software to achieve a model suitable for output. The translation of the knotted cup to CAD models illustrated the parameters of the analogue and virtual materials; the team's next translation from virtual model to 3D print would allow for a new response to the original object, returning us to an experience of material as an "active partner" in a more familiar, tactile form.

As Nimkulrat had not worked often in digital output, she assumed that the transformation of a CAD model to 3D printed form would be straightforward, and that digital fabrication should have a certain level of precision and certainty. This was not the case. 3D printing the virtual cup model presented challenges due to limitations of both print materials and printers, similar to those of craft materials and tools according to task. On encountering the uncertainty and imprecision of 3D printing, Nimkulrat wrote in her journal: "Digital fabrication is not accurate as it may seem. This probably is due to the fact that no judgement of the maker is being constantly made in process (unless the maker observes the machine absolutely at all time" (Nimkulrat, personal note, November 7, 2017).

Nimkulrat and Oussoren explored 3D printing on a range of technologies and scales, including thermoset and thermoplastic material production systems like the Stratasys Objet30, a large format Stratasys F370, and finally a desktop Tinkerine DittoPro 3D printer. At this stage, details of the model were set to be printed as small as 0.4mm using only partial support material as a means of testing and understanding the limitations of the Tinkerine printer. PLA (a thermoplastic) filament was used. The printer managed to print the entire CAD model, but the physical print was too fragile to retain the cup form (Figure 7). This first print that provided the researchers evidence of the capabilities of the printer also inspired students working in the Digital Fabrication lab. Observing Nimkulrat and Oussoren's progress they began to develop their own CAD work in finer detail, thereby further exploiting the full capabilities of the machine.

Based on the print described above (see Figure 7), the 3D CAD model was modified. Gradual increases of the model thickness were tested by printing replicas of varied thicknesses: 0.8mm, 0.95mm, and 1.2mm (Figure 8). In this way the "right" thickness, suitable to the capacity of the machine that also preserved the characteristics of knots, likeness of strings, and fidelity of hand-knotting, was determined. Having compared the resulting prints in different thicknesses, the collaborators agreed that the 0.95mm test print was the most successful. Based on this further 3D

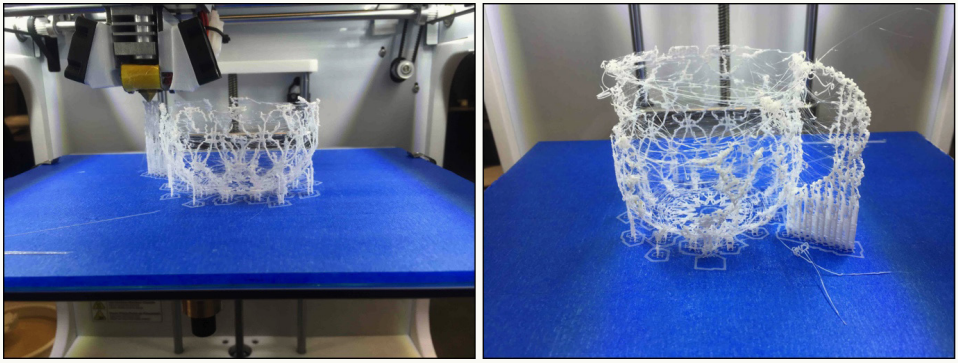


Figure 7. The first 3D printing of the cup on Tinkerine DittoPro 3D printer.



Figure 8. Printed cups in three different thicknesses: 0.8mm, 0.95mm, and 1.2mm.

printing was conducted using PLA composite materials, including wood (30% wood, 70% PLA) and copper (30% copper, 70% PLA).

A solution for successful printing with the selected composites had to be sought through experimentation with adjusting different parameters of the printer's slicing software, such as temperature, speed, density, angle of support material, and many others. For example, the wood filament proved to be extremely fibrous, and clogged the extruder nozzle easily. In response to this the speed was increased by 10% to achieve a better flow of filament. Despite the revised material parameter settings, the resulting prints were still missing parts. The CAD model was re-adjusted and modified again, increasing the wall thickness to 1mm. After several iterations of parameter settings and printing, the researchers were satisfied with the outcomes. Printing the same model with different materials generated interesting results. A close comparison of the printed

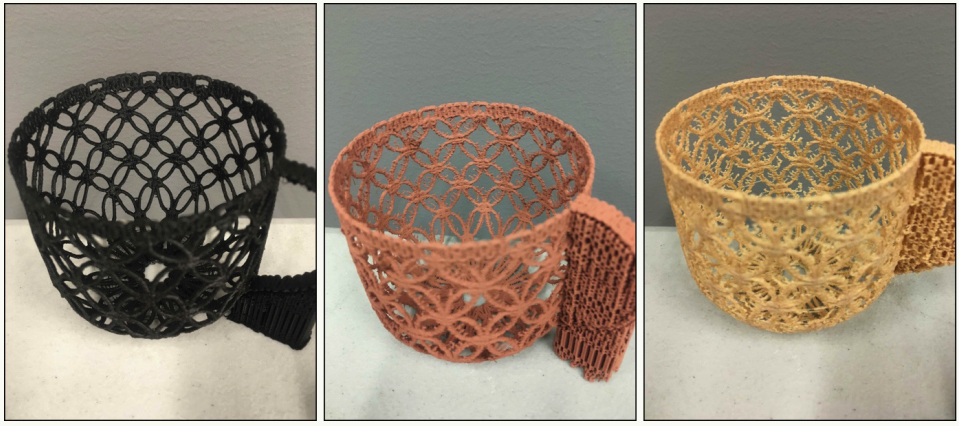


Figure 9. 3D printed cup using three different materials: (from left) PLA, copper, and wood.

cups made it apparent that each filament offered a distinct set of material features (Figure 9). The fibrous effect of the wood print looked similar to growth of roots and was considerably lighter than the ones printed using copper and PLA composite filament.

4. Crafting in virtual reality

The above sections have outlined and characterized the transformation of a hand-crafted object into a CAD model printable on a 3D printer into digitally-fabricated objects. The printed cups had their own characteristics as expressed by the material used; their appearance was generally comparable to the original cup. What was missing from the printed cups was the continuity, flexibility, and bendability of knots, or things that string does well. For this reason, an attempt to represent the nature of knots was made. In parallel to the exploration of printing the cup model with different composites aforementioned, the researchers created a new CAD model of flexible, loose knots. A stylus was employed again to create a section of knot pattern for further 3D modelling. Although Nimkulrat has hand-knotted her three-dimensional work for a decade, virtually knotting on a 2D screen was incomprehensible. The use of a flat screen to work on a 3D model did not adequately depict or open up access to creating a real-world, three-dimensional object. The positions and the interlacing of strands that construct knots were difficult. Although he had no prior experience in himself, Oussoren suggested that drawing in virtual

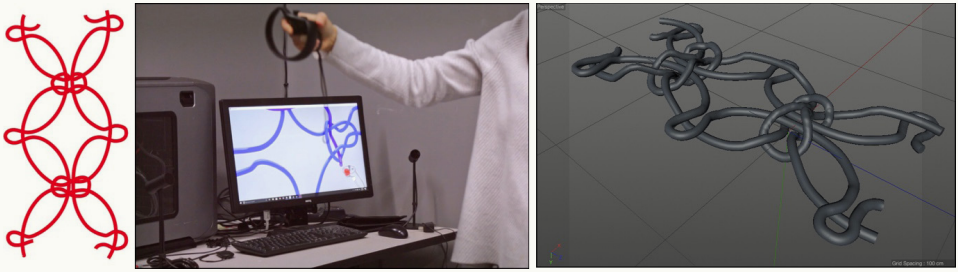


Figure 10. Drawing of a section of knots, crafting knots in VR, and CAD Model of a section of flexible knots.

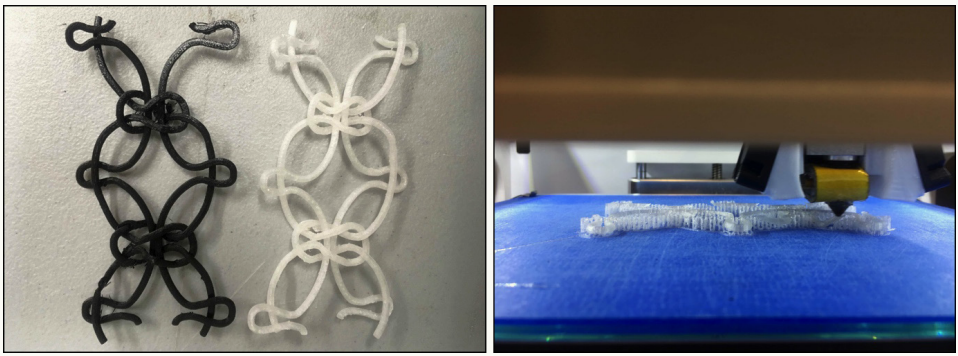


Figure 11. Comparison knots prints from different printers and a side view of the print process showing support material.

reality (VR) space might help resolve this barrier. With the assistance of researcher Sean Arden in the University's Mixed Reality Lab, Nimkulrat was able to draw knot structures in a 3D VR space in a similar (though scaled up) gestural manner to real-world hand-knotting of string. The initial VR drawing session enhanced Nimkulrat's understanding of the three-dimensional positions of strands of knots. Although the drawing in VR was not directly imported to the CAD program, the experience helped to make a CAD model of a section of knots (Figure 10).

Having found a solution for the making of a CAD model through the use of VR, the next solution was to solve the 3D printing process. Often when the model was being printed, the printing nozzle would irritate on a previously printed area with a steep angle and would subsequently shift from its original position on the support material forcing the next printed layer to detach. Initial print iterations fell apart when the support material was removed, or, if they managed to stay whole, had a cracked,

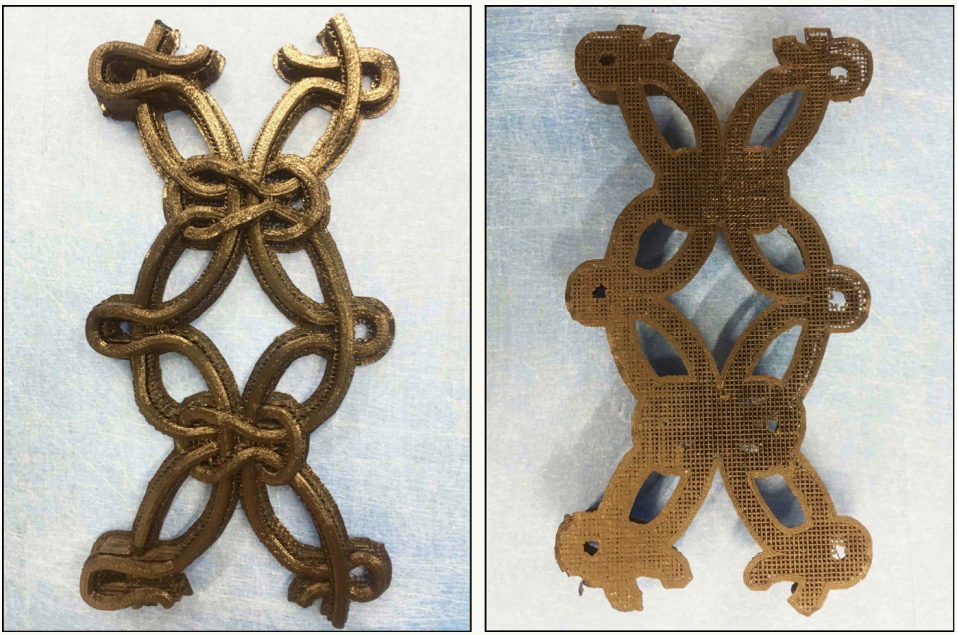


Figure 12. A complete high-resolution print of a section of flexible knots with full support.

rough surface. Two factors contributed to the printing failures: the machine and the setting of the support when generating a g-code file (i.e., tool path coordinates and material parameters) to slice the model. The same 3D model was printed on a different machine. While the result improved areas of cracked surface still occurred (Figure 11).

This output implied that the machine might be influencing the printing process. Next, the slicing/printing parameters were set to generate full, strong support material. A new print was output, but the dense support material was difficult to remove (Figure 12). It seemed that the setting of slicing/printing parameters was perhaps the key. The support material had to be distributed throughout and strong, but also needed to be relatively easy to remove. This approach was used in the next stage of experimentation, the modelling and printing of multi-sectional loose knots (Figure 13).

5. New interdisciplinary craft with 3D powder printing

The Material Matters Research Centre has employed powder printing technology for mould making for use in the metal foundry, glass casting,

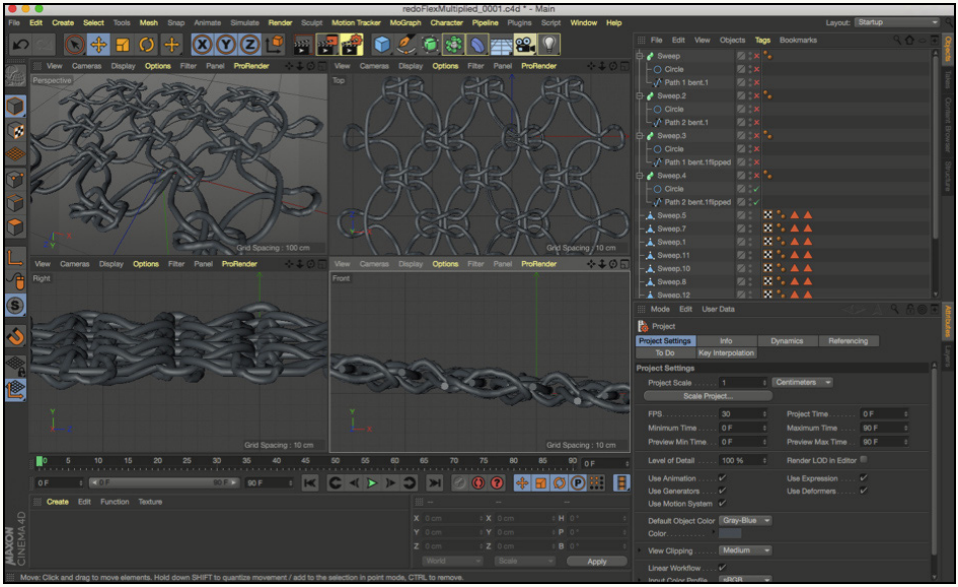


Figure 13. CAD model of multi-sectional knots.

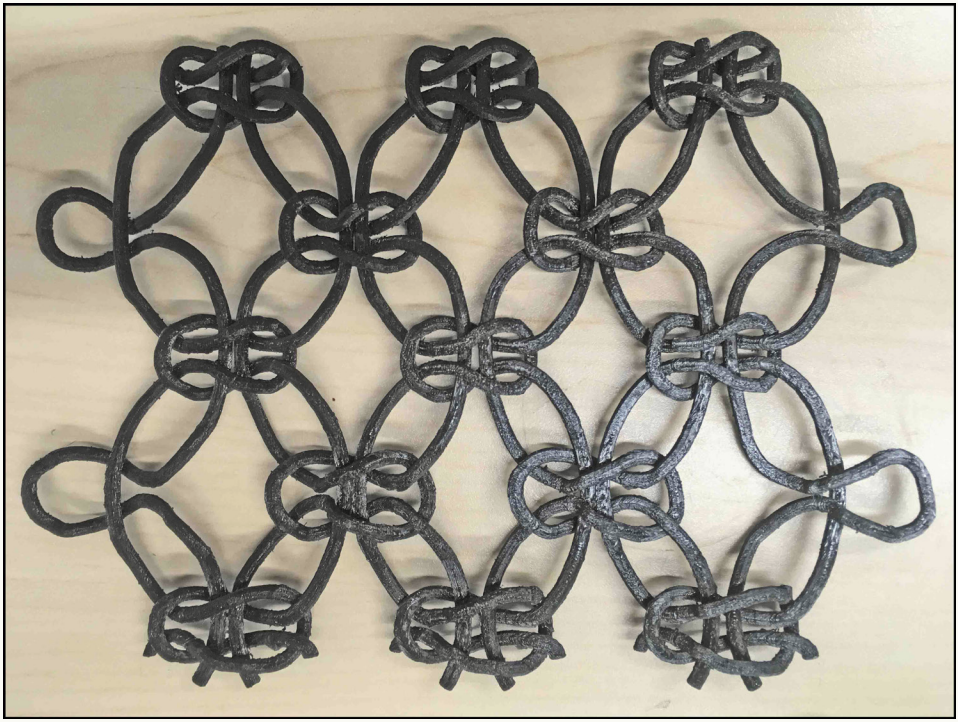


Figure 14. Print of three sections of loose knots.

and slip-casting in previous projects (Oussoren, Robbins, & Doyle, 2015) (Figure 15). While these material techniques seemed far removed from her knot practice, Nimkulrat was interested in learning and applying this method to her work. After accumulating CAD modelling and 3D printing skills, she saw this 3D printing method as a new opportunity for giving her coffee cup function. During her first degree in Industrial Design 20 years ago, Nimkulrat learnt mould making for prototyping (a process where a "pattern" is cast into reusable moulds for reproduction) and traditional ceramics. She therefore understood the general principles of mould making for ceramic slip-casting of multiple parts. Still, not being experts in ceramic slip-casting, Nimkulrat and Oussoren sought advice from Julie York, Associate Professor of Ceramics. Based on advice received they created a CAD model mould for slip-casting a porcelain cup. The mould took into consideration shrinkage and the removal process of the finished cast piece. Figure 16 shows the steps of making a CAD model of the cup mould. A positive form of the cup was made based on the 3D model of the knotted cup used earlier for 3D printing with PLA filament. The knot pattern was repurposed and used as a relief surface detail. A one-inch-thick mould was designed around the cup.

This form was then 3D printed on a Zcorp 310+ binder deposition powder printer, using a custom in-house powder and unique binder reci-

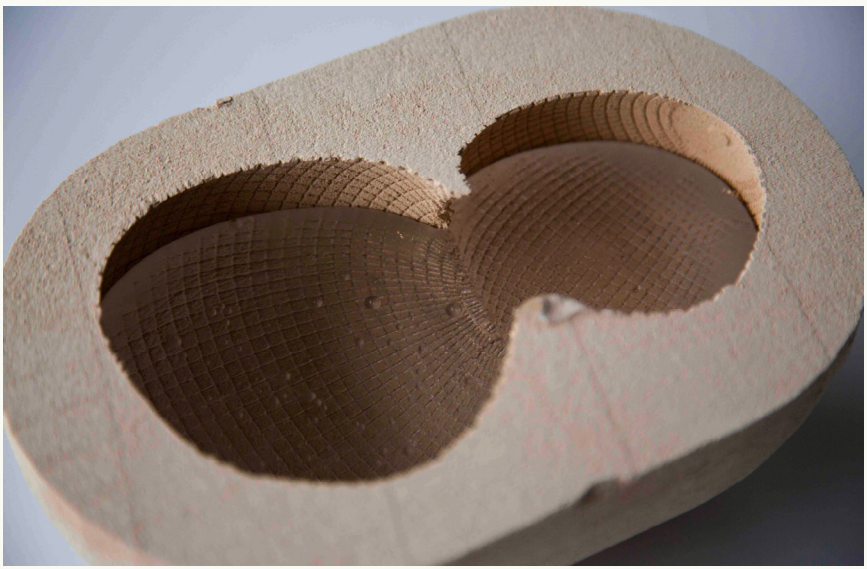


Figure 15. Cast glass in 3D printed mould.

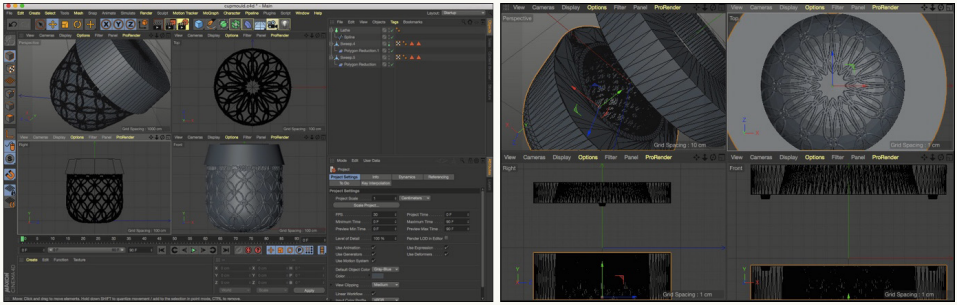


Figure 16. Process of making the CAD model of the cup mould.

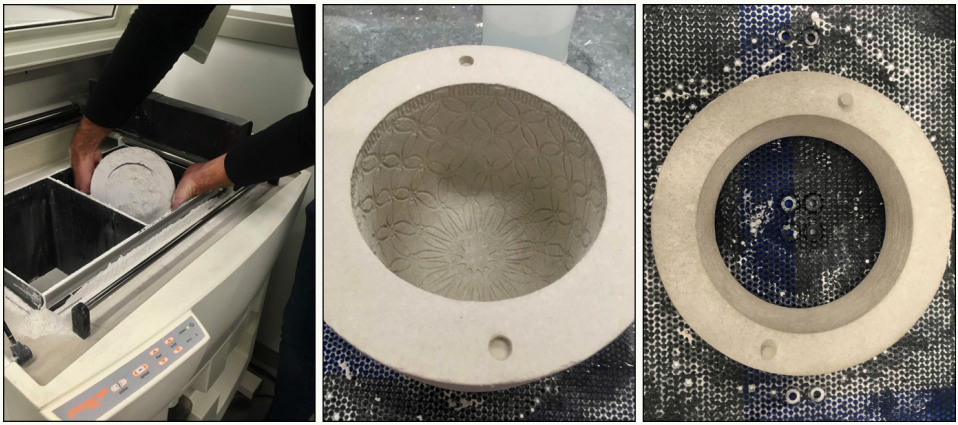


Figure 17. The printed cup mould (bottom piece) is removed from the printer; each piece is sprayed with water and leave to get dry.



Figure 18. Slip casting porcelain using the 3D printed mould.

pes (Oussoren et al., 2015). Upon removal of the mould from the printer, it was sprayed with water to further set the gypsum-based powder substrate increasing its plasticity when dry (Figure 17). The dry mould was used for slip-casting porcelain (Figure 18). As the properties of the material of the digitally-produced mould differed from the plaster commonly used for slip-casting, using it for slip-casting porcelain could not follow the usual principle. For example, the cast pieces need a longer time to set due to the material's higher density.

6. Collaborative making inspiring new practice

The work detailed in Section 5 illustrates design of 3D objects in VR may be translated into glass. For Oussoren, who has worked in a broad range of glass forming methods including glass blowing, kiln, and sand casting (a process where a "pattern" is cast into reusable moulds for reproduction), slumping and fusing, this transition was a natural step (Oussoren et al., 2015). As an affiliated researcher at the research centre, Oussoren has explored, developed, and refined a range of digital fabrication technologies related to ceramics and glass, in collaboration with industry partners. As a sessional instructor at the University he has also mentored classes through processes of design for digital fabrication in a range of materials. His work in collaboration with Nimkulrat, during her residency at the University, utilizing design in VR to generate complex knotted forms for 3D printing afforded new opportunities pertaining to glass design and 3D printing. Oussoren took on a new project that applied the same processes: drawing in VR, developing a mould in CAD, 3D printing in plaster, and then, this time, casting in glass. This direct design from VR to cast glass object described in detail below illustrates new opportunities for form development in craft materials.

The starting point for the work was the ability to capture gesture in VR. Using a drawing program called Gravity Brush, form was generated in a virtual three-dimensional space using VR controllers (Figure 19). This captured gesture was output to Cinema 4D, and used as a positive to generate a mould form. This mould form was then 3D printed in a plaster material suitable for glass casting (Figure 20). After 3D printing, the mould was post-processed using a mould release on the working surfaces of the mould – specifically formulated for use with glass, and dried thoroughly (Figure 21). After drying, the mould was filled with raw material (crushed glass) then fired to full melt temperatures in a digitally-con-

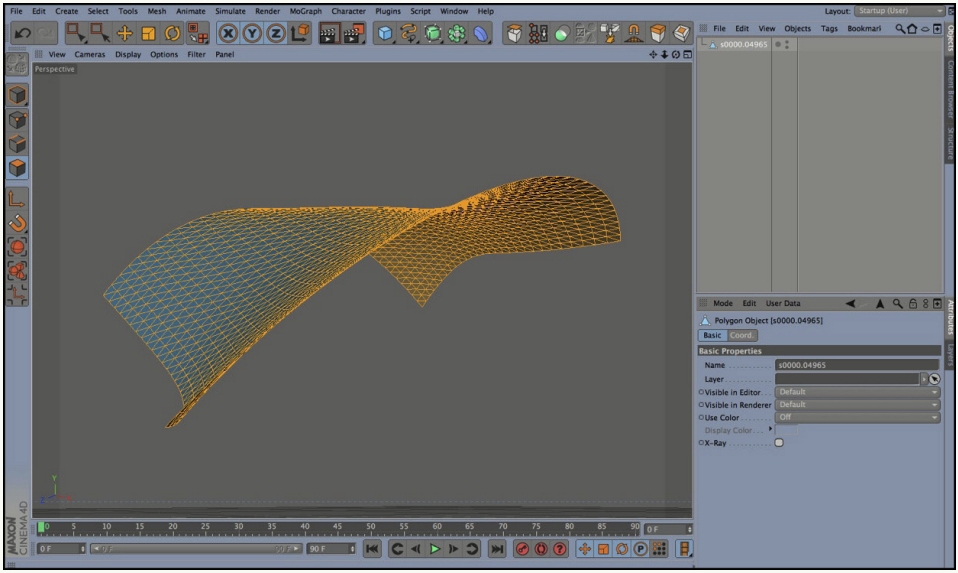


Figure 19. Gestural form captured in Virtual Reality using drawing program Gravity Brush.

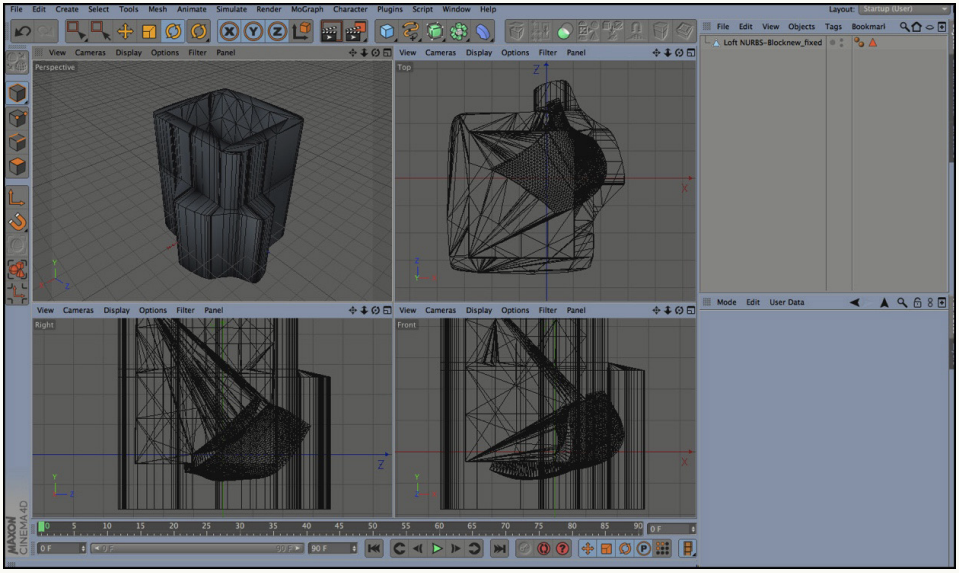


Figure 20. CAD design for mould based on VR form.



Figure 21. 3D printed moulds for glass casting, pre-firing.

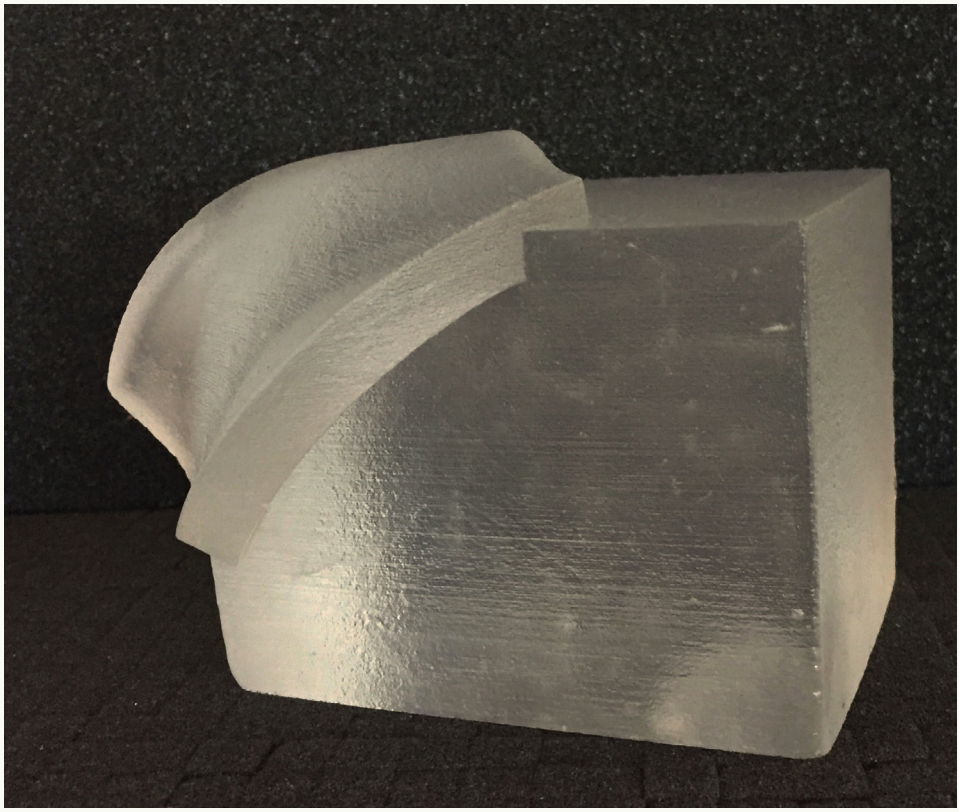


Figure 22. Cast glass from 3D printed mould, based on VR form.

trolled kiln. In this state, the fluid glass then flows to full fuse and fills the pattern void of the mould. This workflow of VR to glass object presents many new opportunities for generating novel forms and surfaces which have previously been difficult or impossible using traditional glass casting and blow-moulding methods. The timeframe for a kiln-casting project is also greatly reduced, as there is no need to make an original positive form to be wasted as required in the age-old process of lost-wax casting method (Figure 22).

The authors' work at the University has explored how traditional material production processes found in ceramics and glass can emulate the freedom of complexity found in computer-aided-design. Integrating 3D printing processes with craft methods enables complex geometries, repeatability, and scalability in the production of traditional analogue materials (Oussoren et al., 2015). A natural question related to digital design and output is how might the digitally-mediated object relate back to the makers hand? In a prescriptive digital design space (Solidworks, Rhino, etc.) form and surface are often dictated by the parameters established by the software. Using VR as a design space may bring our CAD space closer to the nuanced complexity of hand making. In addition to expanding on the expressive potential of CAD, models may be developed in VR in a more intuitive way than other CAD avenues.

7. Emerging pedagogy related to design

The sections above detail a series of research creation activities through collaborative practice, iteration and reflection incorporating emergent craft sensibilities of 3D printing and Virtual Reality technology taking place at Emily Carr University of Art + Design's research labs. These clustered facilities occupy a unique position within the University. They serve as both a compliment and a service to the regular curriculum. They also act to support a rich studio culture at the intersection of research creation, cultural enterprise, and industry. The University's Research Centres employ research assistants (RA) predominantly from the undergraduate and increasingly graduate Design programs within the University. In the curricular context, students are introduced to a diverse range of research methods including, Research through Design (RtD) (Frayling, 1993; Zimmerman, Stolterman, & Forlizzi, 2010), Co-Creative ethnographic practices (Mattelmäki, 2006; Sanders, 2005) and our own faculty approaches to research creation development that make use of sites for provocation

and riposte (Day Fraser & Doyle, 2015). The Material Matters Research Centre and the research activities it supports acts to augment this pedagogy. As noted in Section 3 above the approaches taken by expert researchers and the work they produce serves to inspire students working in close proximity as RA's on different projects. It seeds student desires to push their own material practice and design expectations.

The recent successes of modeling in VR lead Nimkulrat and Oussoren to reflect and question – "How has CAD been introduced to teaching students?" In general, CAD training present in the classroom is a linear process, gradual and incremental skills development supports conventional Design for Manufacture and applied skills development. Coursework follows the typical generative arc of design creation, tackling the fuzzy front end of ideation, through to iteration, prototyping, and design concept development. Incremental learning and progressive skills development of the classroom, in this case, is an approach that may limit craft in the context of VR enabled modeling and form generation. The perceived sensorial immersion and embodiment of a modeling workflow in the VR modeling space stands apart from the sequential assembly processes of modelling in CAD through conventional interface. Editable gestural form-making serves up a disruption to conventional design workflows in 3D, and latterly pulls on course delivery.

Form generation in VR and digital fabrication are influencing our semantic approach to meaning making and aesthetics. The gestural interface and immersive environment of the VIVE VR technology and CAD software enable a sustained *naïve expertise* for the practitioner (Wakkary et al., 2016), a creative approach to complex form and unknown spatial geometries akin to a craft approach that lowers the barrier for uptake and understanding. Herein the tensions of crafts' "Certainty and Risk" (Pye, 1968) are mediated by the immediacy of immersive form generation and time reversal. The immersive interface of VR matches an immediacy of material sensibilities in the freely complex digital environment that closely emulates the concerns of the artisan's proximity to raw material.

The research methods used for this particular study of 3D VR modeling are rooted in a history of material practice and research creation activities taking place in our labs via a variety of material explorations in additive manufacturing, direct 3D printing of glass and iterative tooling for foundry. These integrated activities are readily exploiting the aesthetic, formal qualities that are unique to these legacy techniques through the lens of digital modeling to material fabrication processes (Robbins,

Doyle, & Day Fraser, 2014). Complimentary research creation activities as described in the previous sections of this paper and concurrent design-led industry and academic partnerships at the labs are providing a means for the development of a unique curriculum, embedding craft sensibilities and concerns into a linear assembly, acting as a discrete site for knowledge transfer and mobilization. This host site supports the push of invention, skills development, and knowledge acquisition for students and University's stakeholders alike.

8. Discussion and conclusion

This emerging practice is inherently collaborative, acting as a catalyst for established disciplines within the arts to collide and interact. Outcomes of this study include mapping new workflows within digital/analogue material practice (Figure 23), and reflection on how the materials and methods used in digital fabrication have the potential to expand and illustrate the meanings in the things that are produced. Throughout this collaborative practice, reflection has been made on each iteration of digitally-fabricated objects and ways in which the analogue and the digi-

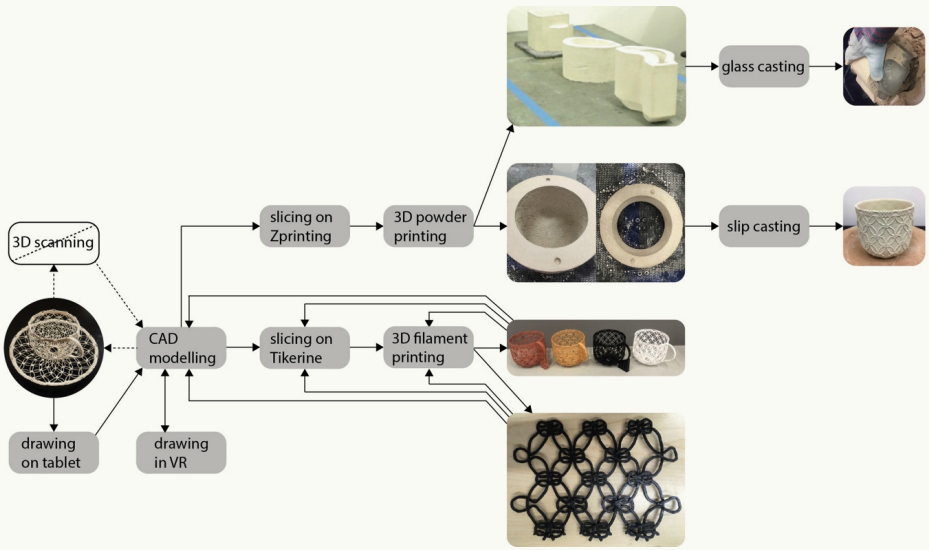


Figure 23. Mapping of the transformation of materiality, from the physical (hand-crafted object) to the digital and back to the physical (digitally-fabricated objects) again, and also from the digital (drawings) to the physical (digitally-fabricated to hand-crafted objects).

tal craft practitioners work together. Through reflection on action, the practitioners make explicit the implicit knowing, turning knowing-in-action into knowledge-in-action (Schön, 1983, p. 25). As Scrivener and Zheng (2012) point out, knowledge-in-action is the practitioner's reflection on the understanding that has been implicit in his or her action – understanding that the practitioner "surfaces, criticizes, restructures, and embodies in further action." Such understanding is evident in the collaborative practice presented in this paper.

The practice exemplified in this paper reveals ways in which digital technology can be use to transfer hand making skill and knowledge into new production contexts. A similarity between working with the analogue and working with the digital that the study has found is the unpredictability of the process. In analogue practice, the exact process cannot be known until the craft practitioner manipulates the material. Likewise, in the manipulation of digital tools, the practitioner cannot predict if the material will take a form similar to the CAD model. Accidents and failures as part of the "craftsmanship of risk" (Pye, 1968) are present in both the analogue and the digital. Materials and tools, of the craft and the digital both, often "resists the maker's intentions and thus actively shape them, revealing new action pathways while closing others (Glăveanu, 2014, p. 55). This is when reflection-on-action becomes helpful; the maker is taken out of the routine of making when contemplating problems in the making that requires a new course of action. Working through iterations opens up the process for the practitioner. It affords skill accumulation, and, when a skill becomes embodied, enables self-consciousness engagement with the process to fade away (Nimkulrat, Niedderer, & Evans, 2016, p. 7). This study, speaks to this process. It reveals an alternative way of learning CAD and 3D modeling, through collaborative, interdisciplinary practice.

This work provided opportunity for reflection on a mixed digital/analogue practice, and what collaboration means in these spaces. To a certain extent a material practice is by necessity collaborative, as it requires knowledge of a range of processes, tools, and materials. This mix of tacit and explicit knowledge is generally gained directly from experts and practitioners in the field. While CAD work has been theorized as working in a "digital material" or "digital craft" (Shillito, 2013), the ways that a digital practice and an analogue material practice engage with knowledge are quite different. A design practice that is heavy in CAD will utilize explicit knowledge and may be collaborative on digital social

platforms. A design practice involving material research and development will, through necessity, engage with tacit first hand knowledge. Our plans moving forward are to continue to explore this – asking what are the emergent workflows of collaboration in this mixed digital/analogue practice.

Nithikul Nimkulrat
Professor of Textile Design /
Head of Department of Textile Design,
Estonian Academy of Arts, Estonia
nithikul.nimkulrat@artun.ee

Aaron Oussoren
Affiliated Researcher / Sessional Faculty
Emily Carr University of Art + Design, Canada
aoussoren@ecuad.ca

Keith Doyle
Assistant professor
Emily Carr University of Art + Design, Canada
kdoyle@ecuad.ca

Hélène Day Fraser
Associate professor /
Associate Dean, Master of Design,
Jake Kerr Faculty of Graduate Studies,
Emily Carr University of Art + Design, Canada
hfraser@ecuad.ca

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Free Graphic Design

Jessica Wexler



In 2013, we formed Workshop Project as a professional design practice whose goal was to imagine what a pedagogical graphic design practice could be. We believed then, as we do now, that education is one of the few areas of design practice where one can be truly innovative. We began by initiating a series of projects whose goal was to discover the form of this new practice by producing its artifacts. We wanted to move to what we believed was the fringe of design education. Four years later, we see that there is no fringe. There is only immersion. We have come to see that the seeds of revolution and innovation are in the everyday work and outcomes of design education. We believe that innovation happens not by trying to predict the future, but by radically embracing the now.

The artifacts we create at Workshop Project – lectures, presentations, workshops, and an online archive of our work and process – are spaces for collaborative exploration and making with our colleagues, students and peers. The workshops, projects, and provocations we offer, both in person and through our wiki site, provide design educators, administrators and students a structured experience and space to build community and discover innovative approaches

to the work they do every day. We view our practice itself as an extended exercise in speculation, as we continue to develop and explore its structure, goals and outcomes.

Our recent self-initiated project, FREE: A DESIGN EDUCATORS WORKSHOP, was the latest of these hybrid professional-academic projects. From July 20–23, 2017, on the campus of Otis College of Art and Design in Los Angeles, we hosted a small group of educators from a broad range of institutions to explore the radical and speculative potential of the everyday artifacts and platforms of design education (tools, projects, syllabi, resource lists and the like) as spaces for new forms of critical writing, making, and discourse. The goal was for educators to generate these artifacts in a space that was free from the constraints of the institution, convention and expectation.

Prompts were designed to resist conventional problem-solving so that participants could imagine, debate, and test-drive the impractical, the extreme and the impossible. In order to allow for the broadest outreach to our peers, we offered this workshop at no charge for accepted participants. The first cohort represented a wide range of institutional, generational and cultural backgrounds as well as diversity of gender, race, and ethnicity.

Here, we introduce the FREE Design Educators Workshop and discuss our collaborative approach to innovation through both a theoretical model (WORKSHOP PROJECT) and a case study (FREE workshop).

Theme: Actors
Keywords: Design Pedagogy as Professional Practice

THEORETICAL MODEL: WORKSHOP PROJECT

At Workshop Project, all of our projects are "artifacts" of design education we use to push our thinking forward. The presentations, publications, syllabi, projects and workshops we produce are an ongoing articulation of our ideas about the future/present of design education.[1] FREE: A DESIGN EDUCATORS WORKSHOP is our latest project

Our body of work engages with, but does not seek to solve, "wicked" problems in graphic design education. We have articulated and developed a set of values that drive our practice:

1. Collapsing Hierarchies
2. Radical Embrace of THE NOW
3. The Future Now
4. Process, Uncertainty and Innovation

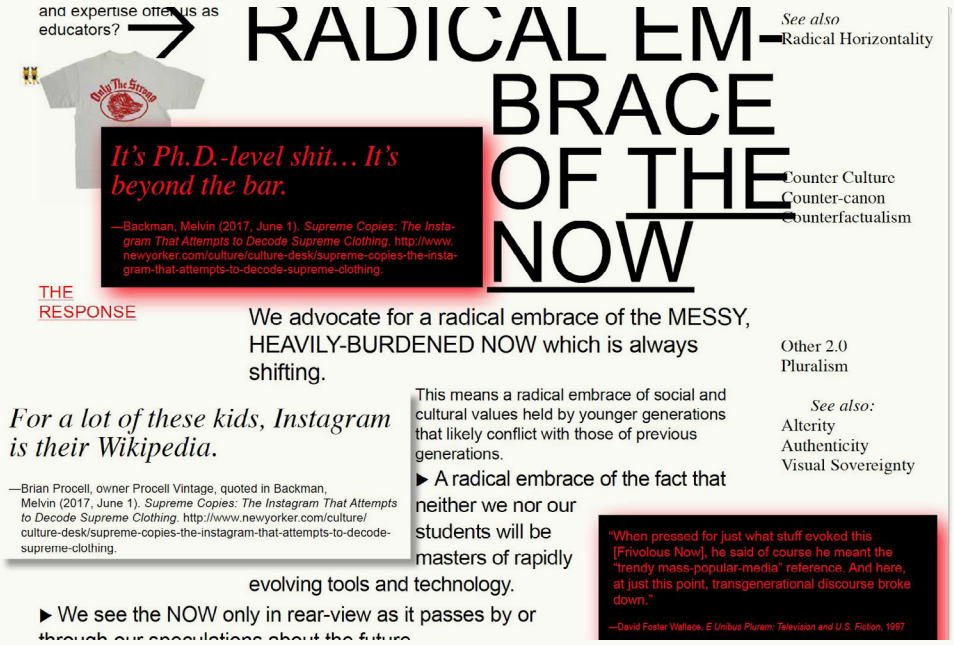


1. Collapsing Hierarchies

Throughout the late 20th and 21st centuries, a combination of factors such as the rise of the internet, the increased speed of technological innovation, and generational shifts in values and priorities, initiated an erosion of traditional centers of power, structures of hierarchy, and authority of expertise, connoisseurship and craft in design education. We have identified two apparent crises in design education as the result of these cultural and technological shifts. We do not approach them as crises, but as opportunities to challenge our own internalized values and priorities. They are:

> The authority of participation born of the internet has been legitimized. Authority of participation is an authority that values engagement and breadth of knowledge, irrespective of credential, expertise or depth of knowledge.

The Instagram feed, Supreme Copies, is an example of this new form of authority. This feed is devoted to “demystifying the brand’s designs”, that is: uncovering the sources of the streetwear brand’s apparel graphics, which are known to reference pop and vintage culture. [2] In this article, vintage picker Brian Procell describes a tshirt featuring the quote “Only The Strong”, inspired by The Lord of The Flies. The boar’s head image (riffing on the Boar’s Head brand of delicatessen foods) “was a nod to the pig’s head that the book’s newly feral boys mount on a stick, and the text ties that moment to the idea that Supreme’s core demographic – well-dressed New York skate rats – had to grow up fast in order to play in city streets.” Procell’s declares the virtuosity of this synthesis of cultural reference as “some PhD-level shit. It’s beyond the bar.” [3] Whether or not your agree this is in fact PhD level shit, the intense investment in decoding the pop cultural references embedded in Supreme’s apparel graphics indicates that the location of critical discourse is on the move. As Procell observes, “For a lot of these kids, Instagram is their Wikipedia.” [4] In a culture of participation, engagement and distributed trust, it should come as no surprise that Wikipedia is perceived as the standard for archiving and disseminating knowledge and information. That Instagram may also be considered a trusted source of information and knowledge signals a



profound shift in the location of and access to discourse and knowledge, and more inclusive, pluralistic notions of expertise.

At the core of all of these shifts and collapses and reconstruction of hierarchies, a fundamental question remains: are these cultural artifacts worthy of inquiry or not? In a culture where authority is a function of engagement, it is becoming ever more difficult to distinguish the trivial from the substantive, especially if one uses levels of participation as a metric. As educators, we are faced with the following choice: Despair at the erosion of traditional authority and hierarchy OR ask what opportunities this crisis of authority and expertise offers us

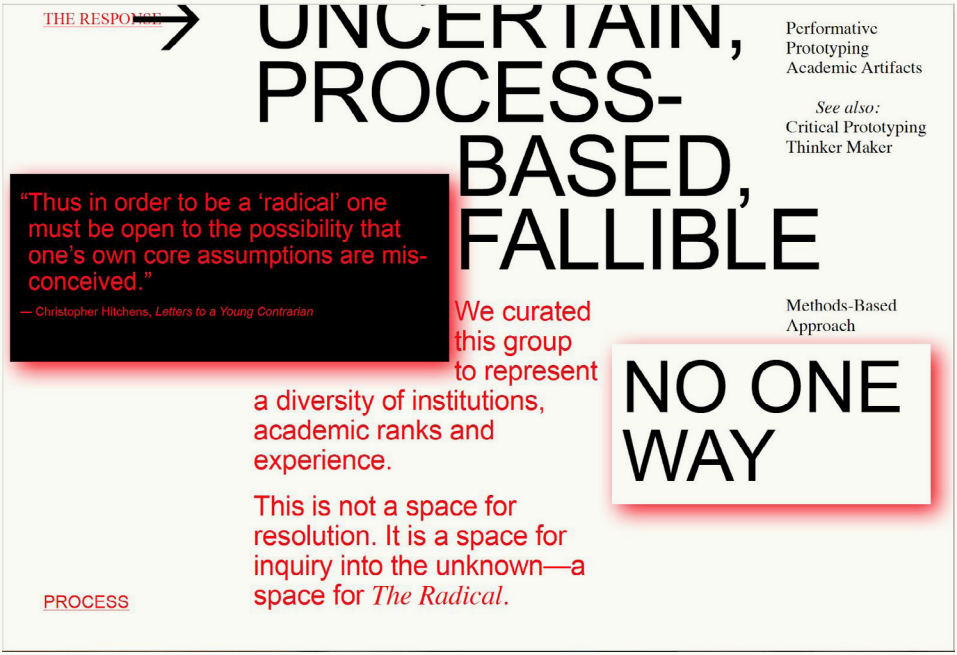
2. Radical Embrace of The Now

A snapshot of today's state of cultural literacy could be characterized by:

- A non-critical culture of "browsing" fueled by digital media that flattens hierarchies of value and quality
- A dilution of expertise, specific knowledge, and considered points of view
- A proliferation of re-presentations of cultural artifacts that are divorced from original context, audience, and author
- A culture of "likes" and "hates" wherein respectful discourse is replaced by comments and re-posting
- A lack of skepticism or criticality of media that results in a shallowness of knowledge and lack of exposure to divergent, contradictory or minority perspectives
- The increasing availability and sophistication of graphic design tools and templates [5]

Our shorthand for this state is "THE NOW". Though it is immediate and unseeable, we are for a radical embrace of THE NOW. We recognize that the value systems that drive THE NOW are different from the ones that governed our own educations – and that is really exciting to us. Our struggle is about how we reconcile this energy with the demands and limitations of our institutions and our responsibility to our students because THE NOW is messy, its slippery and there is no guaranteed outcomes. We know we can't see THE NOW much less define it, even as we sit in it. Instead we are interested in referencing it… in indexing the constantly changing NOW in design education.


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THE FUTURE NOW
NOW = NOW
"The future: the period of time in which our affairs prosper, our friends are true and our happiness is assured."
— Ambrose Bierce
▶ When you speculate about the future, you're making a foil against which you assess the current state of things
▶ There is no truly being ahead of the curve, there is only being in it
▶ Think about post- or hyper-formalism as a node on a web, interconnected to past, present and future ideas about making, thinking, theory and practice as a way of indexing the unknowable NOW.
▶ Find the edge and push beyond.
We're feeling like the time to talk about to the future of graphic design as the future has passed. The future can be ordered, organized, imagined in its best light. That's the fun of speculative design. What we propose, what we make at this workshop may seem fantastical or speculative, but it's actually quite practical. It isn't about future casting.
See also:
Pastness
Doneness
The real future will be what we don't expect, and what we can't expect. Something that's beyond the limits of our current understanding...something beyond our imagining and even our desiring.
—Simon Reynolds
European Lab. (2016, May 31). Forum 2016 : Simon Reynolds - Tomorrow Never Known, le futur imprévisible de la Pop Culture [video file]. Retrieved from https://www.youtube.com/watch?v=kIXKQYckHng


THE RESPONSE
UNCERTAIN, PROCESS-BASED, FALLIBLE
Performative
Prototyping
Academic Artifacts
See also:
Critical Prototyping
Thinker Maker
"Thus in order to be a 'radical' one must be open to the possibility that one's own core assumptions are misconceived."
— Christopher Hitchens, Letters to a Young Contrarian
We curated this group to represent a diversity of institutions, academic ranks and experience.
This is not a space for resolution. It is a space for inquiry into the unknown—a space for The Radical.
Methods-Based Approach
NO ONE WAY
PROCESS

3. The Future Now

In an address at the European Lab Forum in 2016, cultural critic Simon Reynolds observed that "The real future will be what we don't expect, and what we can't expect. Something that's beyond the limits of our current understanding... something beyond our imagining and even our desiring." [6] In other words, there is no truly being ahead of the curve, there is only being in it. Speculating about the future is not truly about envisioning tomorrow, but rather about indexing THE NOW. As Reynolds observes, if a future thing can be described, it can most likely be made or done in some fashion, and so it is in fact about the now.

We are done talking about the future of graphic design. The prompt given to FREE participants was based on the premise that when we are talking about the future of graphic design, we are talking about THE NOW. Any speculations or outcomes generated at the workshop would be a foil against which one could assess the current state of design education.

4. Process, Uncertainty and Innovation

Immersion and embrace of THE NOW means surrendering to being in process. To sit in process requires accepting uncertainty and fallibility. It demands transparency – a revelation of how and why ideas and outcome evolve and unfold, fall apart, and re-emerge. It requires a readiness to evolve out of one's way of working into something else. We believe that though styles, values and technologies change, process endures. By focusing on process rather than outcome, we are reminded that there is no one way.

Investing in process and investigating the everyday artifacts of design education may seem conservative and inward-looking, at odds with contemporary strategies of disruption and speculation. However, when process unfolds in the context of the uncertainty, complexity and messiness of THE NOW, the outcome cannot be predetermined and the result could be an everyday revolution.

FREE: A DESIGN EDUCATORS WORKSHOP, LOS ANGELES CA 2017

Christopher Hitchens, in his Letters To A Young Contrarian, offers the advice "...in order to be a 'radical' one must be open to the possibility that one's own core assumptions are misconceived." [7] Radicality is not an oppositional position. It is a critical position. Through the FREE work-



shop, we offered our colleagues an invitation to engage, to take true risks which we believe is essential for our evolution as educators. FREE was not a space for resolution; it was space for inquiry into the unknown accessed through everyday things – a space for the radical.

We began to conceptualize FREE as a workshop for educators that we would want to attend ourselves. Rather than be a forum for broadcast of completed work or ideas, it would be a workshop in the most traditional sense. It would be a place for design educators to gather and develop ideas through making. Outcomes would not be prescribed or predetermined, and would have to address some of the unsolvable or "wicked" problems with which we engage through our practice.

Robert Buchanan, in "Wicked Problems in Design Thinking" [8], concisely lists 10 identifying traits of wicked problems in design:

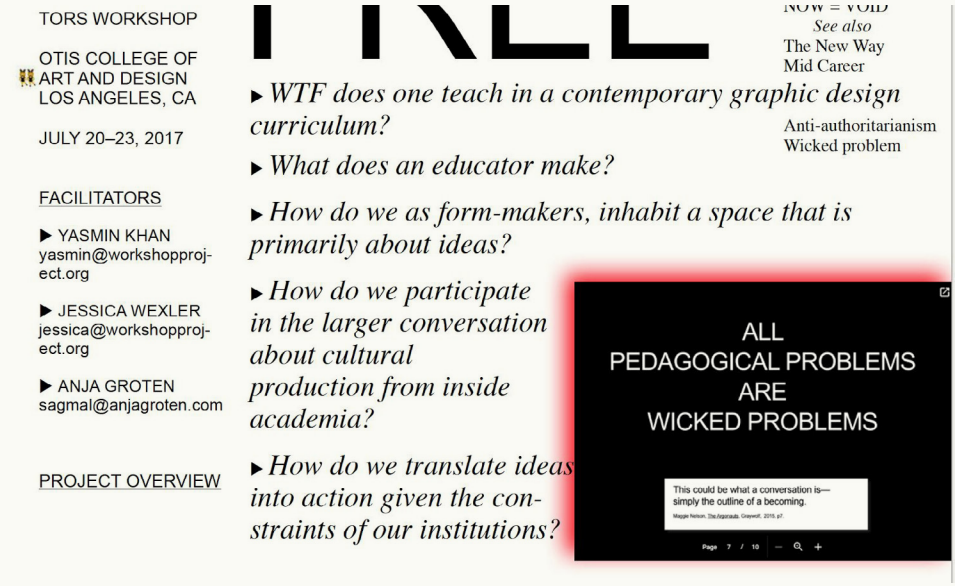
1. Wicked problems have no definitive formulation, but every formulation of a wicked problem corresponds to the formulation of a solution.
2. Wicked problems have no stopping rules.
3. Solutions to wicked problems cannot be true or false, only good or bad.

4. In solving wicked problems there is no exhaustive list of admissible operations.
5. For every wicked problem there is always more than one possible explanation.
6. Every wicked problem is a symptom of another, “higher level,” problem.
7. No formulation and solution of a wicked problem has a definitive test.
8. Solving a wicked problem is a “one shot” operation, with no room for trial and error.
9. Every wicked problem is unique.
10. The wicked problem solver has no right to be wrong-they are fully responsible for their actions.

In short: if a problem is by definition unsolvable and its context is continually shifting, then trying to solve it results in unanticipated consequences – the creation of new problems – while the problem itself persists and evolves. In our practice, we approach all design problems as wicked problems. The wicked problem that continues to drive our practice is:

WHAT DOES ONE TEACH IN A CONTEMPORARY GRAPHIC DESIGN CURRICULUM?

We recognize that this problem is not solvable in a traditional way or in a lasting way. But it is resolvable for periods of time, in various iterations, in different contexts. In the “now”, the current context of collapsing cultural hierarchies, accelerated technological advancement, diluted visual literacy and other forms of connoisseurship, and the questionable location of craft, this elemental pedagogical problem is a problem that demands a different kind of approach: it is a problem that is not a problem but an opportunity. It offers us the opportunity to ask the following questions:



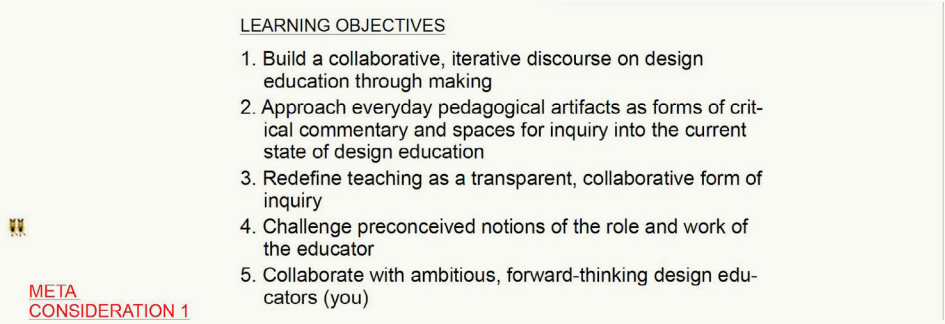
FREE had to be a forum for design educators to propose, imagine and develop ways to resolve different aspects of this larger question, as it related to their institutions, goals and interests. At the meta level, FREE was a space for educators to discover the limits of our practice and push past them. At the concrete level, FREE was part of a larger program whose goal is to offer a platform and resources for design educators to speculate, to generate, to publish outside of the institution.

We began our process by creating a set of learning objectives and putting out a call for applications. We invited fellow design educators to:

> … a workshop that explores the radical potential of the artifacts and platforms of design education (tools, projects, presentations, prompts, resource lists and the like) as spaces for new forms of critical writing, making, and discourse. It invites design educators to imagine, debate, test drive and flesh-out the impractical, the impossible and the extreme in a space that is free from the constraints of the institution, expectation and convention.
>
> Part working group and part think tank, teams will work fast and furiously in articulating a vision/mission statement/manifesto and generating responses in the form of a collection of pedagogical artifacts, platforms and other unforeseen outcomes that will be posted to an ongoing archive of online resources for graphic design

> educators and students. Finally, teams will present, debate, discuss their outcomes, beliefs, values, and interests in an informal public presentation. [9]

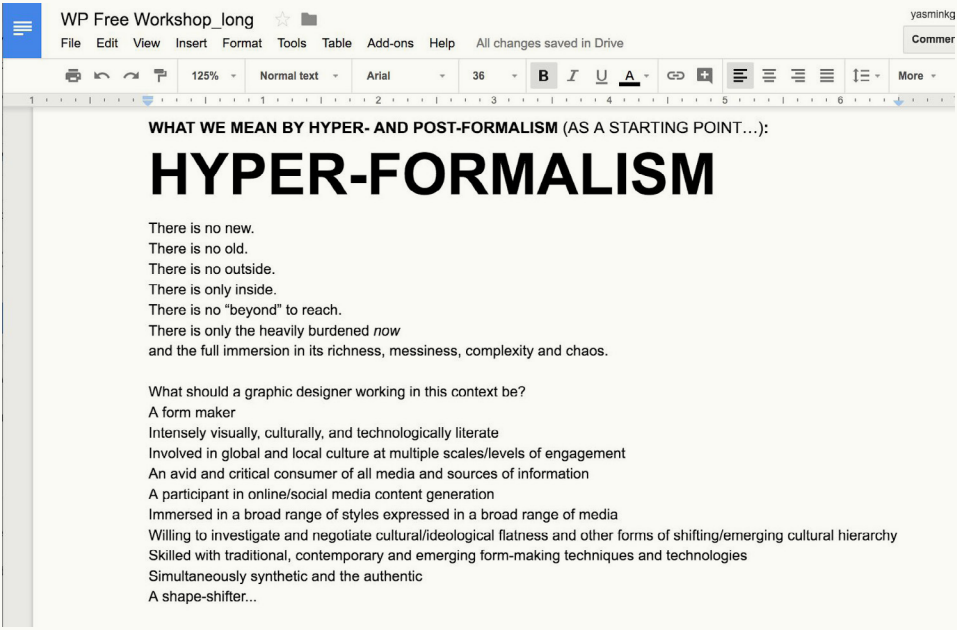
FREE was set up as a working group, a collaborative space for design educators to gather and to discover ways to engage with these wicked problems through making. Our learning objectives, ultimately were as follows:



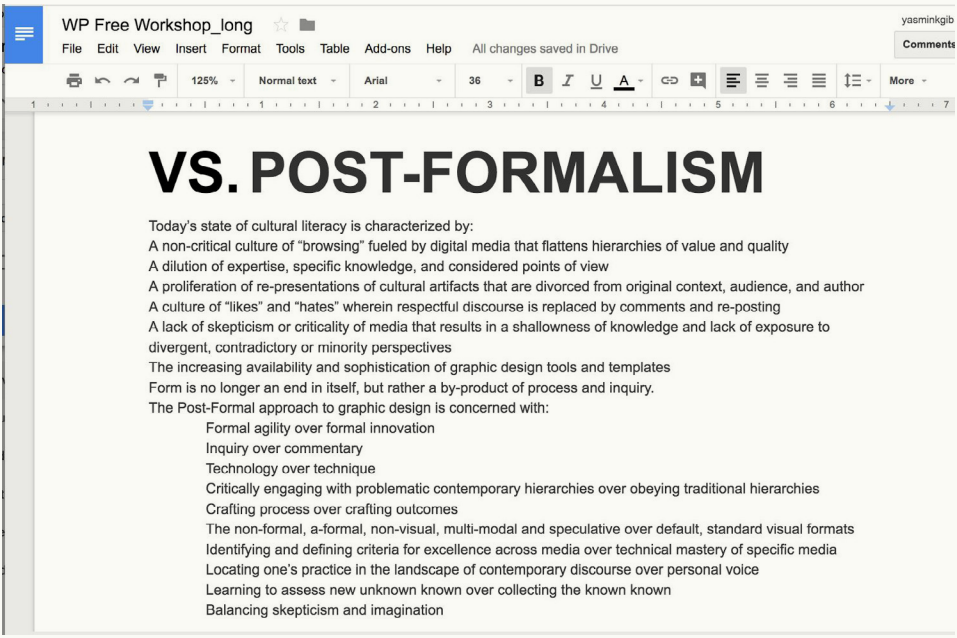
In order to challenge applicants' own opinions and preconceptions, we asked them to take a side in a rhetorical battle, a more ideological wicked problem than what to teach in a contemporary graphic design curriculum:

> This workshop and the outcomes we make are meant to articulate and respond to an ideological position about an urgent issue in design education. This summer will be a battle royale that troubles an old dichotomy:
>
> POST-FORMALISM VS. HYPER-FORMALISM
> IN DESIGN EDUCATION?!
>
> When you register, you will choose a side and join a team. There isno middle position. Teams will adopt a rhetorical position advocating either post-formalism or hyper-formalism as a key tenet of contemporary design education. In response to this position, teams will build a collection of pedagogical artifacts, tools and other unforeseen outcomes to be distributed via an online archive that is freely available to design educators and students worldwide. [10]

Hyper-formalism, in this context was presented as:



While Post-Formalism was described in this way:



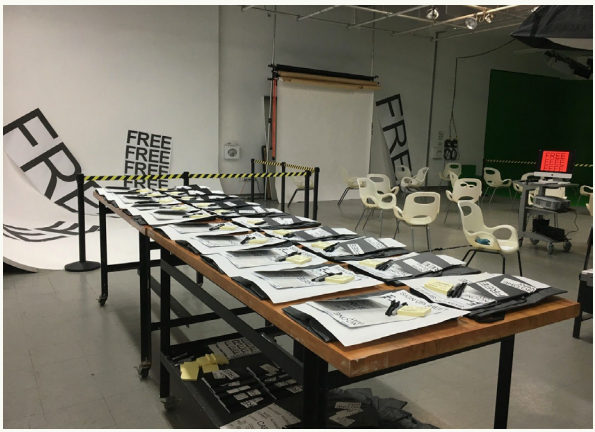
FLATTENED HIERARCHIES AND BUILDING COMMUNITY

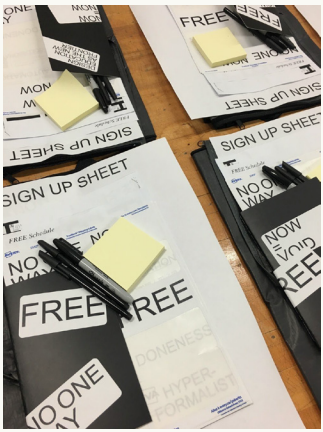
FREE coincided with Design Week and the Artist in Residence program, both organized on campus by the MFA Program in Graphic Design at Otis College of Art and Design. Designers from the US and Europe were on campus to work with students, give lectures, and make work for their residencies. All of the visiting artists for Design Week and Artists in Residence were invited to participate in FREE and all the MFA Program's events were open to FREE workshoppers.

SHIFTING ROLES

As organizers, we quickly realized that our first job would be to dismantle the academic hierarchy in which the participants were used to operating. We expected seasoned full professors to collaborate with part time junior faculty and understood that it may not be easy for everyone to see their fellow participants as equal collaborators.

FREE participants arrived on the first day of the workshop with their expectations for a traditional symposium undermined, but unsure about what specifically to expect. To break down the academic hierarchies that came in with the participants, we devised a suite of strategies and tools such as a name tag/label exercise and free-form sign-up sheets. In their welcome packet, each participant received a collection of materials including a sheet of stickers of terms from the workshop Lexicon. [11] The Lexicon was curated from terms, ideas and themes that we identified in the initial workshop applications. To start the workshop, each participant was asked to select 4 stickers: 2 representing an idea they embraced and 2 they opposed. Instead of the usual introduction based on name, position





and curriculum vitae, participants introduced themselves based on their values and priorities. Participants were able to see beyond professional standing and identify affinities with fellow workshoppers' interests and core beliefs.

The sign-up sheet in the welcome packet asked participants to post an invitation any time during the conference to an event that they chose to organize. The information that the participant/organizer was asked to provide was: WHAT (ie dinner, lunch, etc), WHEN (time, date), WHERE (location). The WHO category was reserved for fellow participants to sign up. Participants posted open invitations to dinners, drinks, gallery openings and dinner at an Otis faculty member's home.

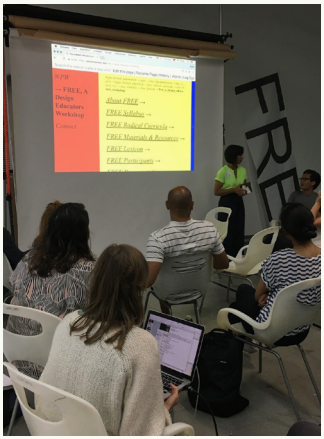
These strategies may seem simple, but their cumulative effect, from the label/name tag to the communal snack table where participants contributed an item (or more) each day, was to conflate categories such as participant/organizer, manager/subordinate, organizer/participant or guest/host. These shifting roles and flattened hierarchy pushed back against participants taking on familiar or preconceived roles at the workshop.

THE WORKSHOP PROJECT WIKI

On the first day of the workshop, participants expected to make something based on their current opinions and preconceptions about Hyper- or Post-Formalism. However, they were immediately asked to:

1. Reconsider their positions in the context of the subcategories: Automation, Visual Rhetoric or Pluralism and
2. Log on as editors to the Workshop Project Wiki site (http://workshopproject.wiki), where all of their work would be documented, shared and published.

The wiki site was built in collaboration with Anja Groten and Andre Fincato of the Amsterdam-based collective Hackers and Designers. The site's role in the workshop was initially conceived of as a platform for documentation. Throughout its development and testing, and as the participants began to use the site, it became clear that this piece of technology would be critical to maintaining the collaborative work environment that characterized the workshop. In addition to functioning as a real-time archive of the participants' work in progress, the wiki site also contained the continually evolving workshop syllabus and an Etherpad, where all



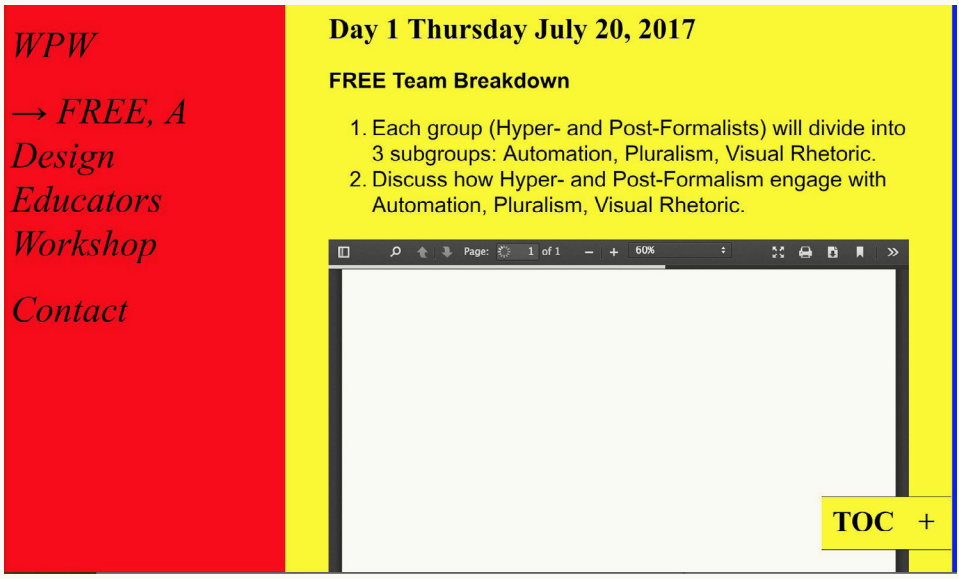
editors (participants) could simultaneously write, post resources and work in progress, and take notes in real time. All of the participants, regardless of their physical location, were engaged in the collective co-authorship of their team's outcomes in real time, all the while witnessing the evolution of the other teams' outcomes. The wiki forced a transparency of process and required participants to sit in the extremely uncomfortable space of working toward an unforeseen outcome inside of the parameters provided by the prompts.

The wiki structure embodies a non-static form of hierarchy that resonated with the values of the workshop. Its authority comes from participation and constant change rather than having definitive answers or solutions. It is process-based. It's limitless, always being built, refined. It is always becoming. Similarly, participants were asked to engage with theworkshop's prompt in "the New Way" (ie the way determined by THE NOW): with the authority and legitimacy of participation. They had the benefit of their collective expertise and experience as well as the challenge of each others' individual biases, proclivities and opinions. There were no designated leaders; all participants were equal team members, authors, editors, and critics, regardless of their relative experience, rank or institutional affiliation.

The workshop prompt evolved daily. Writing, editing and posting the evolution of the prompt and assignments for daily work sessions also forced us to make our process as organizers transparent to the participants. We were sitting along with them in the very uncomfortable space of working towards an unforeseen outcome. We believe that the radical is accessible at this intersection of transparency, inquiry, process and making.

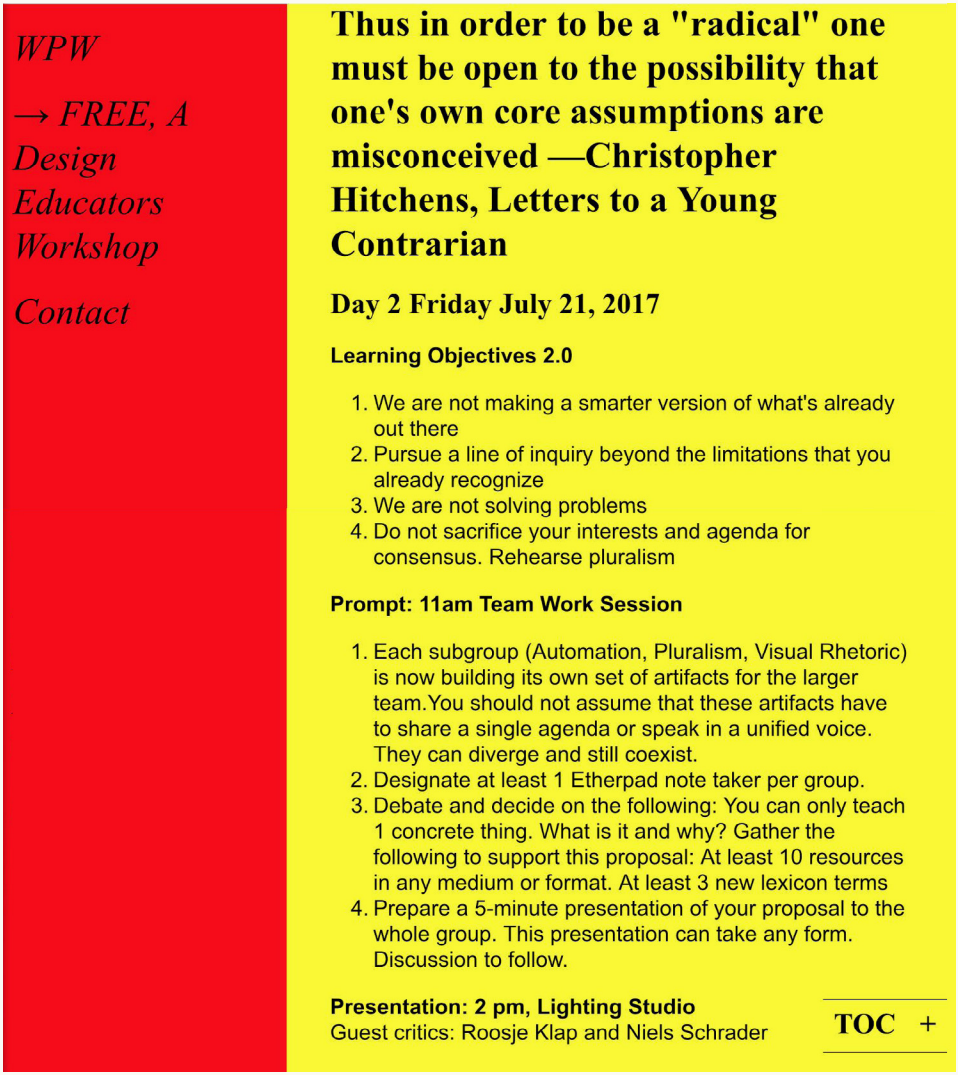
DAILY PROMPTS

As mentioned above, we evolved the prompts and goals for daily work sessions based on the specific challenges that revealed themselves as participants engaged in discussion, conceptual development and making. Outcomes were never specified or predetermined. The only parameter was that outcomes be some kind of artifact of design education.


WPW
→ FREE, A Design Educators Workshop
Contact
Day 1 Thursday July 20, 2017
FREE Team Breakdown
1. Each group (Hyper- and Post-Formalists) will divide into 3 subgroups: Automation, Pluralism, Visual Rhetoric.
2. Discuss how Hyper- and Post-Formalism engage with Automation, Pluralism, Visual Rhetoric.
Page: 1 of 1
60%
TOC +

DAY 2

After an initial day of discussion, the sub teams (Hyper-Formal x Automation, Hyper-Formal x Visual Rhetoric, Hyper-Formal x Pluralism, Post-Formal x Automation, Post-Formal x Visual Rhetoric, and Post-Formal x Pluralism) were given a prompt to start making during this full work day: in their proposed program or curriculum, they could teach only one concrete thing. What would it be and why? Teams were asked to create a corresponding lexicon and resource list in any media.



DAY 3

Day 3 was the second and last full work day for the teams. They were pushed to create a concrete artifact of their proposed curriculum.

WPW

→ FREE, A Design Educators Workshop

Contact

Day 3 Saturday July 22, 2017

Making It

Today you are translating theory into practice—making the abstract concrete. You will be producing a selection of artifacts for your proposed curriculum.

— You are not problem solving. A strategy to resist problem solving: Map the least practical aspect of your curriculum onto a practical artifact.
— The artifact should not be an external/objective description of your curriculum. It should come from inside the curriculum. It should be an example of what it is, not a description of what it is.
— Think of the artifacts(s) that you are making as a critical platform to reveal the implicit value system of your curriculum. How does the artifact give us an understanding of the macro structure and conceptual framework of the curriculum?

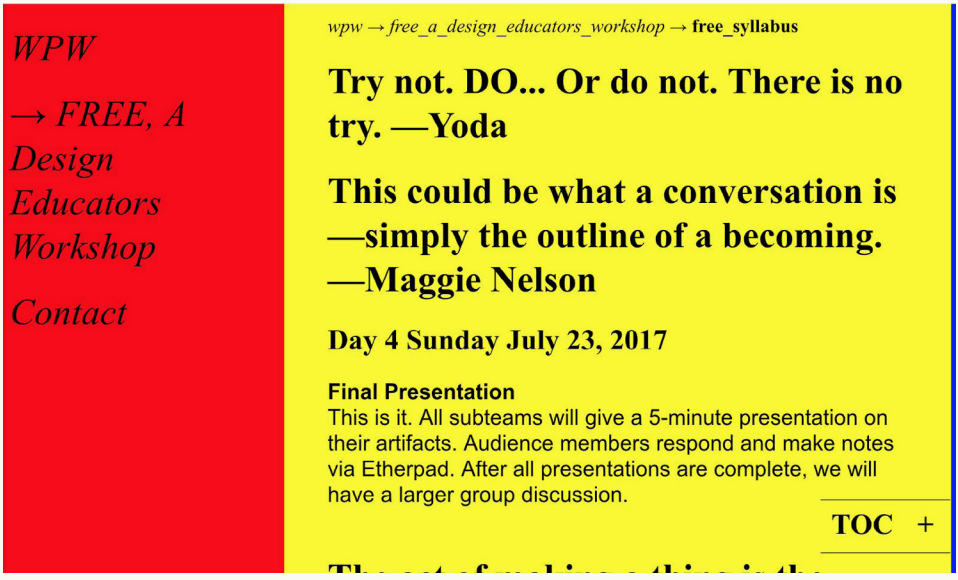
11-5pm Team Work Day

1. Propose 3 artifacts for your curricula. Post to the *Artifact Proposals* article on the wiki by 12pm. Each subgroup has been assigned an individual meeting time with visiting critics, Roosje Klap, Niels Schrader and Kali Nikitas also listed *here*.
2. Please post your working location along with your proposals so that the facilitators and MFA participants can drop in.
3. Select which artifact(s) to make and make them. All artifacts should be complete by 5pm.
4. Meet back in the Lighting Studio at 5pm.

Thus in order to be a "radical" TOC + **must be open to the possibility that**

DAY 4

On the final day of the workshop, participants presented outcomes and discussed the potential for their future development..



OUTCOMES

All of the outcomes of FREE: A DESIGN EDUCATORS WORKSHOP are archived on the wiki site. Some are practical and actionable, while others are clearly speculative. The goal of the workshop was not to generate artifacts of applied pedagogy – whether or not the curricula, syllabi and programs generated by the teams were feasible or realistic was beside the point. The goal of the workshop was to use these artifacts to push the participants' thinking forward with regard to investigating their own values and preconceptions, and how they imagined the potential for their own classrooms, departments and institutions. As organizers, we underestimated the need in the academic community for spaces where educators can engage in thoughtful discourse with equally intense – though not always like-minded – colleagues. The participants of FREE 2017 formed friendships and professional relationships that still endure. Together, we are moving the discourse about the future present of design education forward.

FREE 2018

The next gathering of FREE will take place at Otis College of Art and Design and, like last year, will coincide with the MFA Program in Graphic Design's intensive summer semester, Design Week and Artist in Residence program. Over the past year, we organizers have had new professional experiences (one as a newly appointed department chair in undergraduate Communications Design, the other transitioning from adjunct teaching to visiting faculty status and developing curricula in the online space) that have informed our interests and obsessions about design education. The theme for FREE 2018 is Humanism vs. Transhumanism in Graphic Design Education. We're thinking about the possibility of reimagining graphic design curricula, programs and institutions themselves by marshalling the ever increasing range of technologies and platforms available to us. We are exploring structures and organizational systems from the digital / technological realm to help us imagine new ways to evolve the structures and organizational systems of our classrooms, curricula and institutions. We want to address areas of crisis in graphic design education as areas of opportunity, such as: the global nature of our applicant and student populations; the general decrease in levels of preparedness and experience in MFA applicants; the accelerating rate of change in coding, software and other technological/technical competencies; and the question of how to prioritize such critical aspects of design education as form, craft, concept, technology, process, making, cultural literacy and critical thinking in a two- or four-year program? In short, Humanism vs. Transhumanism is the lens through which we are currently asking: what does one teach in a contemporary graphic design program?

Jessica Wexler
Department chair of Communications Design at Pratt Institute, USA
jessica@workshopproject.org

Notes

1 All Workshop Project presentations, publications, syllabi, and workshop briefs are available online at www.workshopproject.org
2 Backman, Melvin, “Supreme Copies: The Instagram That Attempts to Decode Supreme Clothing,” The New Yorker, June 1 2017.
3 Ibid.
4 Ibid.
5 Workshop Project Call for Applications 02/17
6 Reynolds, Simon. European Lab Forum, May 31, 2016. Forum 2016: Simon Reynolds, “Tomorrow Was Never Known: The Unpredictable Future of Pop Culture” (Le futur imprévisible de Pop Culture). Video file. Retrieved from: https://www.youtube.com/watch?v=klXKQYckHng&list=PLZyU25qhaih-l_ZWioi1-tZMzYI4QFqN9 Ibid.
7 Hitchens, Christopher, Letters To A Young Contrarian. New York: Basic Books, 2001.
8 Horst W. J. Rittel and Melvin M. Webber, “Dilemmas in a General Theory of Planning,” working paper presented at the Institute of Urban and Regional Development, University of California, Berkeley, November 1972. Referenced in: Wicked Problems in Design Thinking Author(s): Richard Buchanan Source: Design Issues, Vol. 8, No. 2, (Spring, 1992), pp. 5–21 Published by: The MIT Press Stable URL: http://www.jstor.org/stable/1511637
9 Workshop Project Call for Applications 02/17
10 Ibid.
11 The FREE Lexicon: Agnostic, Alterity, Authentic, Automation, Care, Collaboration, Counter-canon, Doneness, Embodied design, Mid-career, Performative Prototyping, Radical Horizontality, Stereotype, Super Dumb, Super Pedantic, Super Weird, Technological Literacy, Transdisciplinary Lens

V. TOGETHER... OR HAPPY ALONE?

The collective imaginary of creation is rooted in the figure of the author, the artist, of a distinct personality. The world of creation has always produced a tension between individuality and collectivity. Several design studios showcase the name of the creator behind whom numerous assistants are concealed. In addition, from the top of his 'ivory tower', the creator knows very well how to find his place among his peers. How does this tension operate, between the fact of working alone and working in a group? How much solitude or interaction with others is necessary to give birth to a remarkable production?

Designing with Our Neighbors

Connecting the Community Through Urban Gardening

Paulina Cornejo Moreno Valle

Abstract

The paper seeks to contribute to the knowledge and research on how universities can use their own resources to build bridges through design and social innovation with their surrounding communities. It is based on the case of the Social Design HUB of CENTRO University in Mexico City and its urban garden project CULTIVA, a collective initiative, based on transversal collaboration and the creation of shared value. The paper informs on the development of CULTIVA as a space for learning and social interaction in a neighborhood with a strong decline in public space and community life, and shares findings related to participants profiles, their perceptions and behavior about community life, and the effects of projects and collaborations based on mutual exchange. The research analyses CULTIVA under the frameworks of Ezio Manzini's Map of Participation, and the Social Design Pathways tool, showing different aspects of the project and its evolution, as well as its possible future pathways.

Theme: Alone
Keywords: social innovation, social design, participation, experience-based learning, community building, urban gardening

1. Introduction

CENTRO is a young and dynamic private higher education institution founded in Mexico City in 2004. It is specialized in the creative professionalization in the fields of design, communication, film, architecture and new media. Since its foundation, CENTRO has had an interest in the connection between higher education and social impact. Chairs, faculty members and students have worked together on projects that prioritize social agendas, and its graduates have become committed professionals and citizens, aware of their agency to create positive social change. As a result, undergraduate and graduate students have designed over 100 projects for solving social challenges related to health, education, fare trade, social inclusion, housing, ageing, or sustainability, among other topics.

In 2015 CENTRO was relocated in a new campus designed to accommodate its growing student body and according to the standards of LEED Platinum certification. However, the economic and social complexity of the new neighborhood led to challenges regarding the role of the univer-

sity in the community. In this new context, CENTRO formalized the creation of the Social Design HUB as a transversal coordination to all its majors, postgraduate and master's degrees. Under an experience-based learning approach, the HUB seeks to promote co-creation and collaborative problem solving (PISA, 2015, NESTA, 2016) for the designing of projects with social value that strengthen the community form different perspectives (urban, economic, social, cultural, etc.) while developing skills in students that strengthen their potential and agency regardless their chosen career paths.

One of the most emblematic projects of the Social Design HUB has been CULTIVA, an urban farming project that aims to build an educational and social space to foster capacity development (in students and neighbors), community empowerment and, consequently, the gradual impact on the generation of small ecosystems and microeconomies for the area.

2. The HUB and the Community

> *Universities could be providing much more brainpower to solve the problems of the communities they live in. (...) Students' wish to be better prepared for work and life. Students are well aware that not much real work involves studying solo to absorb knowledge (...). Understandably they want more real-world experience of problem-solving in teams.* (NESTA, 10 Predictions for 2016: Challenge-driven universities to solve global problems)

The Social Design HUB focuses much of its time and efforts in building relationships, collaborations and mutual exchanges with the surrounding community of the campus at the América neighborhood. Along with neighborhoods 16 de Septiembre and Daniel Garza, the America is located in the west of the city, forming part of a complex enclave at the Miguel Hidalgo municipality that is flanked by two important avenues and a high speed highway. Over the past two decades this enclave has suffered the negative effects of urban renewals and the sprawl of the city to the west, letting to isolation, poor air quality, mobility problems, insecurity and the fragmentation of its social fabric. The area has an heterogeneous social composition with mixed uses, combining highly deteriorated dwellings with ground-floor retail activities (groceries, food stalls, phar-

macies, locksmiths, liquor stores, etc.). The inhabitants are mainly adults and young adults (OVIE, 2017), who do not usually participate in public or community activities.

The community has a strong deficiency of recreational spaces and public life. The very few public areas are inadequate, underused and poorly designed. A good example is the unfriendly metal fence that barriers the entrance of the Municipality's library and cultural center Faro del Saber on Sur 128 Street, at the heart of the America. An underused and neglected urban space, that doesn't provide shadow or a place to sit, despite having a privileged location in front of the market and being the largest semi-open public space in the community. Other examples are two poorly designed and installed recreational areas located in the surroundings of Sur 128 on approximately 30 m² and 40 m² of asphalt paving.

In terms of mobility, the urban interventions of the past decade to improve circulation and safety have had a negative impact in the public life. The removal of traffic lights on Constituyentes Avenue to make it a high-speed road and the construction of underpasses for cars, have isolated the community from the Chapultepec Park (the biggest one in the city) and the historical cemetery, contributing to the decline in public space and community life. The disappearance of crosswalks and the installation of pedestrian bridges, considered to be crime hotspots and only accessible through narrow and neglected sidewalks, have posed a barrier to these assets for the community.

In 2016 a collaboration of the HUB with the Postgraduate in Futures Design (Montes de Oca, 2016), organized a community workshop under the name *Journey to the Future of the America*, designed to explore neighbors' ideas about community spaces and its future. Participants agreed



Figure 1. CENTRO Aerial view and surroundings, 2016. Photo: José Jasso



Figure 2. Enclave map. America neighbourhood in red. Google maps.

that its main public space was the market, located on 128 street, which not only lacks of green or recreational areas, but has serious problems related with infrastructure erosion and lack of maintenance. They also remarked the poor presence of the Faro del Saber, the wastage of public space at the entrance and its rather unwelcoming gate. It should be mentioned that the lack of community spaces has let neighbors Bárbara and Pedro (living on 130 Street) to rent their garage space for gatherings and social events.

A more recent collaboration with the postgraduate under the name of *Time Capsule* (December, 2017) included a mix of neighbors, designers and filmmakers. Through a set of cards and a speculative design exercise, participants were invited to collectively imagine the neighborhood 20 years from now, using as a starting point the bad news related to crime and insecurity in the area, as well as accurate information on community assets and demographics. The outcome was the design of front pages of newspapers or magazines featuring possible future realities. One of the deliverables hypothesized about the rich persons form across Constituyentes (on the side of the Chapultepec Park) living over 100 years, better known as "centennials", thanks to the oxygen they would take from the America enclave.

The overall experiences with workshops and the interaction with community members suggest, not only a lack of public gathering spaces, but also poor quality of infrastructure, inconformity with the policy-making, inclusion of pedestrians (elderly populations, children, not to mention bike users), the poor role of authorities, and the high criminality in the area. All these, have contributed to corrode the social fabric, while spreading a pervasive culture of fear and distrust.

3. Conceptual framework

The concept social innovation encompasses a wide range of approaches and its definition varies according to authors and organizations. The Stanford Social Innovation Review defines it as "a novel solution to a social problem that is more effective, efficient, sustainable, or just than existing solutions and for which the value created accrues primarily to society as a whole rather than private individuals" (Phills, et al. 2008). Likewise, Ezio Manzini (2015) considers that social innovation occurs when people, knowledge, and material resources come into contact in a new way, creating new and unprecedented meanings and opportunities.

While other definitions share the underling principle of social added value, they also make explicit reference to the empowering of specific groups and the transformation of social relations or collaborations to meet social needs (Murray et al, 2010; TEPSIE, 2014).

As there is no single definition, there is no single outcome. Therefore, social innovation can range from production process, technology, principles, ideas, part of a legislation, social movement, intervention, or a combination (Phills et al.); new products, services and models (Murray et. al); to social entrepreneurship and the activity of social enterprises, the reconfiguration of social relations and power structures, and new models of local economic development, societal transformation and system change, among others (TEPSIE).

Although social innovation is not attached to a specific field, it is triggered by the search of efficient solutions to social needs that seek lasting social change. Thus, much of the social and environmental initiatives of the last decades are social innovation processes that go beyond traditional boundaries and are based in crosscutting collaboration. It is not coincidence that much of the most creative action takes place in the sectorial boundaries of very diverse fields (Murray et. al).

In this scenario, the global city scene of the last decade has shown a growing interest in providing solutions to alleviate some problems associated with urban expansion. Alternatives have emerged in a multiplicity of green projects managed either by public or private institutions, cooperatives, neighborhood groups, collectives, schools, or any organization with economic, environmental or social purposes.

This trend has gradually demonstrated a myriad of benefits. On the one hand, it is shifting the paradigm that only farms and farmers should be in charge of food production. On the other, a growing number of studies are suggesting that green spaces can generate benefits in terms of better mental and physical health, improved social capital, crime prevention, reduction of urban heat, or better air quality, among others (WHO, 2016).

For author John Thakara (2015) the great diversity of green projects is primarily driven by necessity, and characterized by resilience, self-organization and solidarity. He cites cases of urban agriculture and self-sufficiency production, which have historically gained strength in times of crisis. For example, Cuba where the fall of the USSR led to the interruption of food flow, triggering a citizen response for local food production and its subsequent regulation. It is revealing that 12% of the urban area of Havana is dedicated to urban agriculture.

In this regard, another interesting example comes from Yue-man Yeung (1983). During 1980 a successful community garden program took place in the city of Manila at a 1.5-hectare located between two squatter communities at Matalahib neighborhood. The project succeeded with the contribution of different stakeholders (local authorities, university, experts and a community group) and for over a year, the garden produced up to 80 percent of the needs of 400 families and was visited by locals and externals. The experience suggested that urban gardening could serve as a tool for urban revitalization and have a positive effect in the reduction of exclusion, gang fights and malnutrition. Unfortunately the project ended when the government sold the occupied land to developers.

A more recent case was seen in in Spain during the last decade, with the exponential growth in the number of urban gardens. According to Gregorio Ballesteros (2014) these have increased from 2,492 in 2006 to 15,243 in 2014, a phenomenon he attributes to both a global trend and the economic crisis.

Either as the result of economic crisis, increasing awareness or global trend, it is very significant that 25–30 percent of world's urban population is growing food locally (Urban Agriculture in the Developing world, 2013). Worldwide, more and more cities are moving towards greener agendas with the adoption of diverse models and policies. Just to mention a few: in 2015 mayors form more than 100 cities of the world signed the Milan Urban Food Policy Pact, to coordinate efforts around food systems and urban agriculture; Vancouver plans to become the greenest city in the world by 2020 through a plan that includes the production and consumption of local foods; Copenhagen, the European Green Capital of 2014, requires new buildings to include a green roof; Paris recently passed a law to invite citizens to grow food free of toxic pesticides in any place or public space (sidewalks, parks, walls, facades and roofs); San Francisco is promoting the agricultural and commercial activity in residential, commercial or industrial areas; Medellin has a Public Policy on Food Security, Food Sovereignty and Nutrition, which includes agricultural production in the city; Cape Town has a Urban agriculture policy which promotes food security and aims to build social capital by specifically supporting female farmers.

In the local context, Mexico's City government has made numerous efforts to promote the creation of green roofs, orchards and urban gardens. In 2016, the congress passed the Law of urban gardens to encourage food production in the city. According to an urban and periurban

agriculture report (FAO, 2014), Mexico City is one of the ten Latin American cities that stand out for their urban agriculture. Further steps are being taken with the announcement of "Espiga", the largest urban garden in Latin America, and with the plans to install 11 orchards in seven housing units in the city (FAO, 2017).

Urban gardens not only provide benefits as regards of food production, but also can contribute in the sense of wellbeing and in building stronger communities. A recent study (Catell, et al., 2017) noted that sociability and face-to-face interaction in spaces could give relief from daily routines, sense of community, opportunities for bonding ties or making bridges, and influence tolerance. Likewise, other studies have pointed out that green spaces are linked to the creation and strengthening of social networks, the exchange of information, and the increase in social connectivity and collective pride that can inspire community for other improvements (Wolf & Rozance, 2013).

In this context, Blewit (2015) points out that poor quality built environments can affect the physical and mental health and trigger anxious and aggressive behaviors in contexts commonly associated with crime, disorder, noise, traffic, and pollution, while relaxing and peaceful urban green areas can restore the sense of well being of the inhabitants. According to Cattel et al. (2017) the quality of a public space is commonly perceived as a measure of the quality of urban life.

Regarding security issues, a study of the University of Pennsylvania (2012) suggested that neighbors living near greened vacant lots felt safer, while incidents of police-reported crimes seemed to decrease (Garvin et al, 2012). Previously, a nine-year period research (2011) observed the impact of the Philadelphia LandCare Program, concluding that the greening of vacant lots could result in the decrease of armed robbery and vandalism and the improvement of quality of life among residents.

Whether from an organization, movement, educational institution, design agency or artist, there are a myriad of social innovation projects happening around the globe focused on urban agriculture and green infrastructure. Universities are no exception on these issues and have given rise to projects such as COLTIVANDO, a collaborative productive garden developed by designers and community as part of an educational and research initiative of the DESIS Lab Polytechnic of Milan; Grow Dat Your Farm in New Orleans, a collaborative farm incubated by Tulane University and the Community Design Center of the School of Architecture, which seeks to motivate young people from different contexts to

create environmental change through a more just and sustainable food system; or the Dronsife Center of Drexel University in Philadelphia, a neighborhood resource which gathers knowledge and expertise of local partners and hosts activities for Drexel communities and neighbors, including a community vegetable garden.

4. CULTIVA: a bridge for collaboration

The HUB shares the theoretical and methodological approaches of Ezio Manzini (2015) regarding design for social innovation, nevertheless it should be noted the existence of a conceptual distance in terms of his understanding of social design, considered as a welfare practice, linked to helping marginalized populations or users that can't afford design services and, therefore, providers must do it motivated by ethical principles and under charitable schemes.

For Ezio Manzini design for social innovation "entails a sociotechnical transformation driven by and oriented towards social change" and occurs through a social conversation or "co-design" between different actors interested in achieving the same result under an innovative approach. According to him, design experts should be able to guide and feed the conversation of the co-design process, through a dialogic capability and supported by their creativity and culture, keeping in mind that they are making things happen as part of a design process which they support but can not control (2015). In this line of thought, Manzini states that more and more people are rediscovering the importance of collaboration and that community gardens are an excellent example of places where, in addition to creating more and better green areas, its possible to make friends and build community.

This said, the CULTIVA urban garden initiative is a complete new project developed under a co-designing approach and oriented towards social change. An initiative primarily aimed to promote networking, exchange of information, knowledge and ideas within the extended community of CENTRO (mainly neighbors, students and university staff). CULTIVA is the result of combining people, ideas and practical design tools and creativity from the design context, in order to align different efforts. Collaborations range from the master gardener of CENTRO, to undergraduate students of Industrial Design, Fashion Design, Marketing, Visual Communication, Digital Media, Interior Design and Film, who have worked together in several aspects of the initiative (naming, visual

identity, DIY orchard modular system, workshop contents, booklets, posters, social networking and even short videos for its promotion), as well as graduates students from the Master in Design Studies.

Objectives:

- Promote experience based learning and collaboration.
- Reach and engage the community through urban gardening workshops.
- Promote the creation of orchards and green areas, which could bring social benefits and support local micro economies.
- Build links, share and exchange knowledge to encourage the development of a more integrated and supportive community.
- Combat disinformation regarding community issues.

4.1 Project Design

CENTRO's campus is a Platinum LEED certified building with specific attributes that must be kept according to its original design. Despite the presence of beautiful roof gardens and green areas, the installation of anurban garden posed a challenge for the HUB, due to the building's design and the lack of available spaces. In 2016, the research for the bachelor's degree thesis in Industrial Design of Cristina Espinosa (Verde Raíz, 2018) proposed a DIY modular orchard system for home use that could help deal with the lack of green areas in the community, the limitations of space in homes, and the high costs associated with urban gardening infrastructure. The system was adopted by the HUB as a first step in the creation of an orchard garden. Espinosa's idea came while coursing seventh semester, where she was strongly inspired by the Social Design mandatory course, where students reflect on the potential effect of their practice, and develop projects for and with the surrounding community under a collaborative approach.

Her research was supported by faculty, students, neighbors and the master gardener of CENTRO, Vicencio García, who not only contributed with knowledge and feedback on different topics (material strength, design, functionality, types of crops) but in the testing of the prototypes in different spaces and conditions over time.



Figures 3 and 4. DIY Module with connector produced through a plastic injection moulding process. Social Design HUB, 2017.



Figures 5, 6, 7. CULTIVA demonstration of crate assembly and D.I.Y system. Social Design HUB, 2017.

DIY Model

The DIY modular orchard sisytem is based on 45 × 30 cm polypropylene plastic high-density crates with 15–30 cm depth (usually reused and bought at very low prices at local markets) depending on the type of crop that will be planted. With the addition of plastic and tape the crates can be sealed inside to avoid the leakage of water and substrates. These low cost crates are highly functional due to their strength and lightweight and because they do not require major modifications for assembly. (See figures 3, 4, 5, 6, 7).

To support the crates in different heights, 7/8" wood sticks (broom sticks) are assembled on its corner-holes. Wooden dowels are also insert-

ed through the sticks, attaching the crates at the desired height (leaving space for ventilation, irrigation, care and growth). Maximum dimensions are 30 x 40 x 120 cm. The overall cost can range from $50 to $85 pesos forcrates and sticks, and around $120 pesos including shade net, plastic, substrate and seeds.

While this is its simplest mode and it has proven to work, Espinosa developed a connector plastic piece aimed to give more stability to the structure, provide support to the base and connect the sticks. First prototypes were produced through a plastic injection molding process and are currently being tested at CULTIVA and at a neighbor's orchard. While this solution might result in higher costs, 3D printing could be an alternative for giving the DIY modules more strength and stability in the long term.

4.2 Workshop Delivery: From Product Design to Community Engagement

After initial tests and adjustments, the prototype for the DIY modular orchard system became the foundation of the pilot project CULTIVA. This initiative of the HUB aimed to offer the community basic knowledge and tools for starting their gardens. To that end, the master gardener along with a group of social service students (Mexico requires all undergraduates to complete 480 hours of social work in order to earn their degree) planned a workshop under a theoretical and practical approach, which required the gathering of samples in the field, and the design of materials such as the pest and disease control instruction booklet for participants (see Fig. 10).

The first pilots of CULTIVA workshops were delivered to neighbors and CENTRO's students and staff in Fall 2016 by the master gardener with support of social service students. Recovery rate was $100 pesos in exchange for the workshop and materials, which included a simple modular orchard kit (plastic crate, substrates, seeds, wooden sticks, labels). Participants were organized in two groups in order to work for three fortnightly Saturdays on four-hour sessions for a total of 16-hours. With the workshops, the HUB established that materials should be purchased at the local market to support neighborhood economies.

CULTIVA workshop syllabus	
Day 1	Self-introduction of participants to the group Types of vegetables, orchard organization, places and plots, distribution, types of seeds, sowing, planning, growing beds, types of soil. Practice: creation of personal mini garden.
Day 2	Germination, types of germination, planting trays, planting season Practice: preparation of seedlings and germinating trays, preparation of seeds
Day 3	Transplants, rooting, composting, seedlings and care. Practice: Transplant a variety of vegetables, medicinal and aromatic. Rooting: stevia, steam, mint, etc.
Day 4	Botanical extracts, natural cure for pests and diseases Practice: identification of pests and diseases on plants and vegetables, preparation of botanical extracts

Table 1. CULTIVA Workshop Syllabus. CENTRO.

Throughout the workshop, participants have a theoretical-practical experience that allows them to learn the techniques and replicate them elsewhere, while observing the process of growth in their own DIY orchards. Each session is open for constant feedback and questions, and includes a 20–30 min coffee break, to mingle and network.

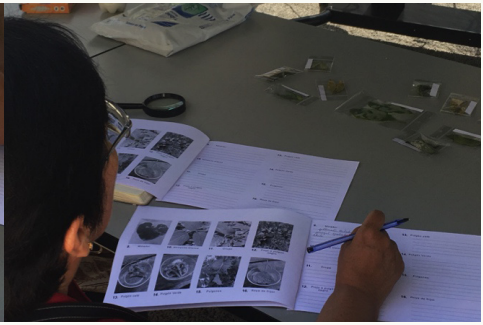
At the end of the 16-hour, participants receive a certificate of achievement and celebrate a gathering (with some fresh herbs harvested from the gardens) that often brings together different groups of CULTIVA.

4.3 Results

The pilot was launched in 2016. The two groups had an attendance of 15 and 17 respectively. During the closure and final gathering (that brought together both groups) qualitative assessment surveys with open-ended questions were applied. The aim was to get feedback, contact details and other demographic information, while gathering opinions related to workshop expectations, previous knowledge on the topic, what they liked most about the experience, as well as any change of perception (good or bad) in relation to CENTRO. Findings were obtained from 24 responses (22 from neighbors and two members of CENTRO) with a large predominance of female population (87%). It is important to mention that 25 percent of participants were missing in this final activity; therefore results might vary slightly.




Figures 8, 9. Configuring crates and sowing seeds. Social Design HUB, 2016.

Figures 10, 11. CULTIVA workshop. Plagues and diseases activities. Social Design HUB, 2017.




Figures 12, 13. Workshop sessions. Social Desing HUB, 2017.

Participants profile

Age		Gender	
Under 15 years	3	Female	21
15–24 years	4	Male	3
25–34 years	0		
35–44 years	5		
45–54 years	7		
55–64 years	2		
65–75 years	3		

Most liked

Representative answers to the question: What did you like most about participating in the workshop?

> We had the opportunity to put in practice the planting; all queries were solved, and all the topics were interesting. Lizbeth Castellanos, 43 years old (CULTIVA Workshop Survey, 2016).

> Sharing with the neighbors and the instructors, in addition to learning. María de los Ángeles Cervantes, 75 years old (CULTIVA Workshop Survey, 2016).

Of the 24 responses, 15 agreed that what they liked most about having being part of the workshop was practical learning, while seven said it was the sharing and / or meeting of new neighbors. In five cases the answers were combined, referring to learning and / or sharing with neighbors as a secondary topic.

Perception about CENTRO

Representative answers to the question: Did attending this workshop change in any way (positive or negative) your perception of CENTRO?

> Yes, CENTRO is interested in our community, in its growth and improvement. Ana María Montes de Oca, 61 years old. (CULTIVA Workshop Survey, 2016.)

> Yes, I like to come to CENTRO more and more. Thank you CENTRO! Irma Patricia Hutrión, 55 years old. (CULTIVA Workshop Survey, 2016).

All of the respondents (24) indicated that their perception of the university changed for good, mentioning topics like the friendliness and disposition of students and staff, or the debunking of false claims regarding the university. For example, when CENTRO opened its campus, people sparked rumors on the high water consumption of the building, causing discomfort due to the water scarcity in the community. In response, CULTIVA workshops included a guided visit of the building, its green roofs and an explanation of the water recovery and recycling systems. Thus, participants were able to verify that the building mostly consumed collected rainwater and had nothing to do with the water scarcity problem of the neighborhood.

It should be noted that 13 respondents (54%), affirmed they have not had previous contact with CENTRO.

Perception about the community and new contacts

Representative responses to the question: Did attending this workshop allow you to meet new neighbors and / or change your perception of the community?

> Yes, I met valuable people and I learned that our community is not only what we see and judge. Meet and know our neighbor's is good. Elizabeth Torres, 44 years old (CULTIVA Workshop Survey, 2016).

> Yes, the neighborhood tends to have bad reputation, with this and other projects you are inviting the community to show that there are people who are not as the other people think. Fernanda Segura, 23 years old (CULTIVA Workshop Survey, 2016).

Hundred percent of the participants in the survey responded that they met new neighbors. Additionally, some mentioned that these activities favored the change of perception about the community and its inhabitants.

On this regard it should be noted that informal conversations, Facebook posts on CENTRO's networks and interviews with students and experts at the university about CULTIVA and other projects of the HUB, suggest a change of perception for good in both directions. When the campus first moved to the America neighborhood, the rumors of insecurity and the unfamiliarity of the place, contributed to show prejudice against the community. Likewise, the building of a private university led to a feeling of rejection in some neighbors, who mistakenly-believed the university would take its water supply and bring along other problems.

During 2017, the CULTIVA workshops divided the survey in an entry and an exit questionnaire. This made it possible to gather contact information in the first part, and anonymous feedback on their experience in the second. Both parts contained open-ended questions, the first one, regarding expectations and how participants learned about the project, while the exit one, asked about changes in perception about CENTRO and the community (for good or bad), if the workshop helped in getting to know new neighbors, or if it met their initial expectations. It is worth mentioning that the average rate of missing participants per group was 15 percent, which might result in a bias. The respondents (57) revealed very similar results to the previous findings: the wide age range of participants (7–76 years); the large proportion of female population; the level of satisfaction with the practical component of the workshop; the meeting of new neighbors (reported affirmative in all responses except in the few cases of external participants).

Additionally, the survey incorporated the open-ended question: Do you usually participate in community activities? Eighty to ninety percent of respondents in four editions of the workshop during 2017 reported they did not. Special attention should be given to the fact that the very few neighbors participating in other community activities are persons attending Senior Activity Centers or the Cultural Community Center Faro del Saber.

By the end of 2017, CULTIVA workshops had reached seven editions and 98 participants between ages 7 and 76 years old. The group sizes varied from 7 to 25 persons including students, university staff and mostly neighbors, who were invited through word of mouth referrals, street outreach, posters, Whattsapp and social networks (HUB, CULTIVA and more recently CENTRO).

CULTIVA has had impacts that are difficult to measure and quantify, but that are very important for the goals of the Social Design HUB. For example, about 25 to 30 percent of the participants continue collaborating in activities and workshops and many of them have become close friends among them. Some other participants are business owners in the area (ice cream shop, hardware store, street vendors, etc.) that have strengthened their relationships with the university and other members of the community, helping them grow their customer base. Another example is the case of neighbor Guadalupe Mejia, a close collaborator for the design and testing of the DIY modular prototype, who has taken part of many workshops and activities and has become a provider for small and medium sized catering services at the university. Guadalupe has also

delivered a couple of workshops for students and neighbors related to food and tradition as part of the Day of the Death activities.

4.3 Improvements

The CULTIVA project was officially launched in Spring 2017 as an experienced-based learning permanent initiative to foster exchanges and community cohesion. Over the year, and with the collaborative efforts of outside experts, students and neighbors, CULTIVA was able to expand in different ways:



Figure 14. Germinating create planted by participants to provide seedlings to the next CULTIVA group, labels and identifiers. Social Design HUB, 2017.
Figures 15, 16. CULTIVA, succulents and pots, 2018. Social Design HUB.



Figures 17. New CULTIVA settings in an underused space. 2018. Social Design HUB.

Continuing education: due to the demand of external people the workshop was incorporated into the continuing education program, offering a few spaces for outsiders at its real cost (recovery fee is a privilege that must be kept for community members, students and staff, all earnings from other external fees are used to sustain the program).

- Increase in recovery fee to $350 pesos: after the pilot, it became clear that people was willing to make a higher and more realistic exchange for the workshop. This is important, since the aim of the HUB is to avoid charity and encourage mutual exchange.
- Logo and identity design: two undergraduate students from Marketing and Visual Communication undergraduate degrees, respectively, made the proposal for the logo to the group and refined it until reaching the final identity. This was applied to printed materials, tags, social networks, etc.
- Production of succulent plants: the yearly celebration for teachers included a present consistent in a small baby succulent taken from the green roofs and planted on biodegradable pots with the tag of CULTIVA and care instructions. Gradually, other areas of the university started asking for plants and soon the productive capacity was exceeded.
- Expansion to a new site: in 2018 with the help of social service students from Fashion and Textile Design, Interior Design and Industrial Design, CULTIVA will expand towards an underused area of the university in order to have a permanent site for production and teaching.
- Workshops and activities as exchange: CULTIVA delivers free one-day practical sessions where volunteers receive knowledge and plants in exchange of help for transplanting plants in small pots.
- Learning space for regular classes: CULTIVA launched collaborations with faculty members who bring their class to the orchard area in order to learn and experience the project, while reflecting on innovations that could add value to it.
- Toolkit for community gardeners: visual and written tool for printed and electronic distribution that will allow sharing the contents and methods of CULTIVA workshop under a free license. Contents and design are being developed in collaboration with social service students.
- HUB day: every Wednesday the HUB features a special open activity related to a different workshop. Therefore, once a month CULTIVA followers can learn about topics such as medicinal plants, fruit trees, seed banks or have an open conversation on sustainable issues. Faculty, external experts, students and neighbors can be invited to guide the session.

5. Ezio Manzini: Participation Map

As mentioned before, according to Manzini design for social innovation entails the physical and social dimensions of design (the sociotechnical), which is the designing of new products or services that are oriented towards social transformation (2015). In line with this approach, the CULTIVA project considers these coexisting dimensions. First, in the design of a physical product by reusing plastic crates and wood sticks (the modular DIY system) to solve the problem of space for urban agriculture; and second, because its driving force is the potential social and systemic impact in the surrounding community of CENTRO.

To deepen the reflection on the levels of participation and interaction, as well as in the existing flows between participants, the reader will find an analysis of the development stages of CULTIVA, according to the quadrants of Manzini's Participation Map (see Fig. 18).

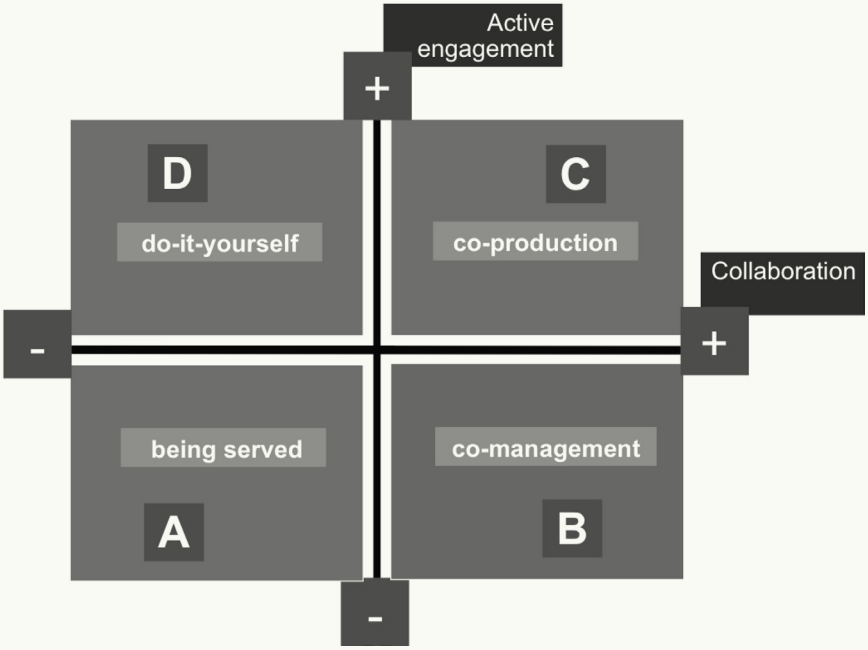


Figure 18. Ezio Manzini Participation Map

CULTIVA development stages:		
Quadrant	Feature	Applied to CULTIVA
C Co production	High relational intensity and strong link between the parties	The university and the HUB function as the base organization in charge of coordinating the efforts of the participants (faculty, students, experts, neighbors). Collaborators need to work side by side in order to achieve significant results.
B Delivery	Low participation of users in terms of design and operation	While the attendees (primarily neighbors) are active participants who take their own decisions regarding the design of their crate and crop selection, and share knowledge and experiences of their own plants and soils, their most active role is the planning of the final gathering. High relational intensity and weak links are the common feature, that is, once the four sessions are taken, it does not require much in terms of time and energy, or future commitment by the assistants.
D Replication	Do-it-yourself	The DIY method and the contents learned in the workshop are designed to adapt and be replicated in a personal orchard that can fit multiple needs. The fact that four seniors form the Cooperativa de Vivienda de Palo Alto (a housing cooperative nearby) interested in building a community garden took part in the fourth edition of CULTIVA, opened up the possibility of transferring the knowledge to a different community.
A Not applicable	Being served	

Table 1. CULTIVA stages of development.

It should be noted that evolutionary trajectories have been observed throughout the CULTIVA experience. This is, an average of 30 percent of attendees tend to increase their participation and engagement with the university while enrolled at CULTIVA and afterwards, which in the matrix is equivalent to moving from quadrant B to C. Despite the creation and delivery of new community programs at the HUB, the CULTIVA workshops and activities remain the first point of contact for most neighbors.

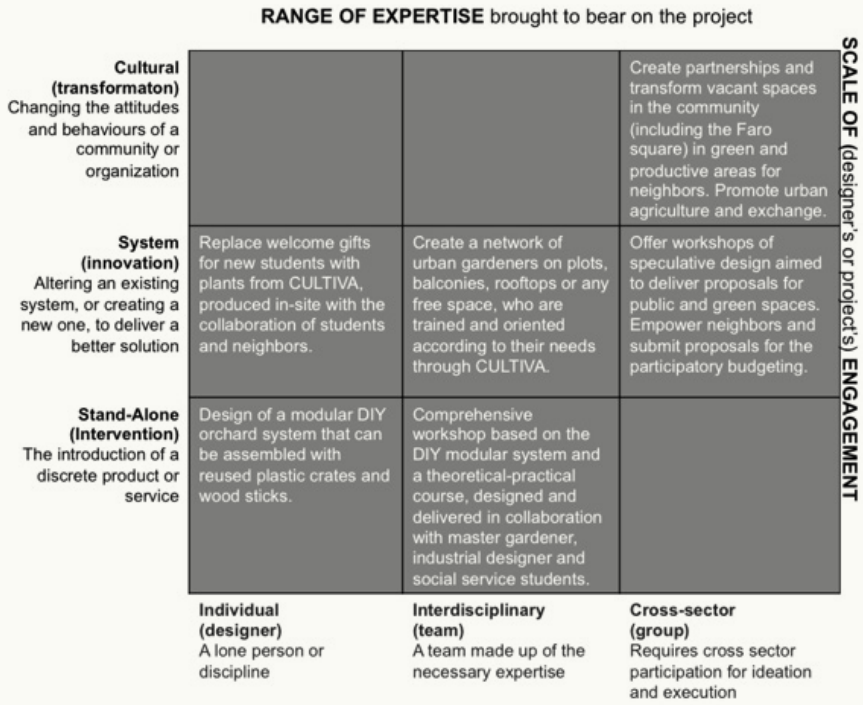


Fig. 19. Pathways in Social Design, 2013. Winterhouse Symposium for Education and Social Change. Licensed under Creative Commons Attribution.

6. Design Routes for Social Innovation

The Pathways in Social Design Matrix is a tool proposed in 2013 by a group of experts at the Winterhouse Symposium for Education and Social Change. It seeks to map the terrain, stakeholders' involved and potential impacts of social design projects. As its description states, it can be useful to help guide an initiative, reveal the participants, partners, resources, and required skills for action, scales of engagement, and possible outcomes for a given challenge.

The matrix allows the analyzing of projects in light of their real or potential impact. In the following section, the method is applied to CULTIVA, through the review of past and present stages, and by projecting some future and desirable scenarios in the long term.

Stand-Alone / Individual

The intervention is the prototype designed by student Cristina Espinosa as part of her bachelor degree thesis dissertation in Industrial Design.

This mostly considers the technical aspects of the proposed D.I.Y. module, an idea she was working in before collaborating with the HUB.

Stand – Alone / Interdisciplinary

CULTIVA's main component is a comprehensive workshop based on the DIY modular system and a theoretical-practical 16-hour course that was co-designed and delivered by a variety of participants, who contributed with their experience, knowledge and skills.

System / Individual

The HUB proposed to give plants as a gift from the university slowly replacing welcome gifts by grown in-site plants from CULTIVA. This is possible through the collaboration of social service students, externals and neighbors who, in exchange, receive a brief workshop on transplantation and plants.

System/Interdisciplinary

In the medium-term, it would be desirable to consolidate a network of urban farmers cultivating on plots, balconies, rooftops or any kind of free space. Farmers would be trained by CULTIVA and advised for solutions according to their specific needs. The network would have a social positive impact through the strengthening of community relations, the production of a variety of vegetables and fruit trees, the reduction of urban heat island effect, the air quality, and the overall satisfaction and communication among neighbors.

System // Cross-Sector

In collaboration with the postgraduate in Future Design, the HUB has been collecting information and opinions on critical issues for the community, among which, the lack of green and public spaces rank very high. The intention is to offer a series of workshops on speculative design aimed to deliver proposals for the creation of green and public spaces in the area, and invite neighbors to submit results in the participatory budgeting, which has very low participation rates.

Cultural // Cross-Sector

In the long term, it would be desirable to adopt a collective impact approach and seek the combination of efforts of different stakeholders in the area (universities, public and private schools, private hospitals, etc.)

working towards common goals (Kania and Kramer, 2011). This would include the recovery and transformation of vacant lots and other potential spaces into green and productive gardens, under a low-cost and collaborative design scheme to make it replicable. The initiative would be aligned with recently approved law on urban farming in Mexico City, and could benefit not only the production of local food and the image of the neighborhood, but the social relations, the sense of trust and engagement, and even the perception of security in some areas.

7. Conclusions

This paper analyzed the creation and development of CULTIVA as a social innovation tool, designed for building bridges between CENTRO university and its surrounding community. The results have demonstrated how with very few material resources, and even lacking of a physical green space, it is possible to launch an urban gardening project that can result in a learning experience, and in a space for social interaction and knowledge exchange in a very complex area of the city.

At the close of this paper, the CULTIVA process, including the research phase for the development of the DIY module, was 16 months old. The evidence and feedback obtained through the past seven editions confirm the relevance, interest and viability of the initiative. There are good reasons to believe that the effort of working with the community through CULTIVA can be a mutual advantage for the university and the community.

Some benefits are:

- The possibility of developing solutions to real social problems (experienced-based learning).
- The collaboration and exchange between students and users.
- The gathering of information and feedback regarding community issues and its possible solutions.
- The building of trust among neighbours, students and staff.
- The promotion of community services that can solve needs for the university.
- The support of local economies (most of the materials used in CULTIVA, and other workshops of the HUB are bought in the local market).

A valuable lesson of this experience is the fact of being based in student's research on community needs and how this initial idea was able to escalate into a collective project. This suggests that designers interested in social innovation should always bear in mind the complex layers of collaboration needed to be effective and, of course, always seek expert and community guidance (which in a way are the only experts in their own problems).

As far as the social sphere is concerned, informal evidence and information gathered through the surveys, suggest that although participants do not usually take part in neighborhood group activities (mostly because they are inexistent), they have been receptive and open to collaborate. This is, some persons are willing to break the apathy and the dominant patterns of behavior to be part of this initiative. In this sense, it is not unreasonable to aspire in the medium and long term, to a gradual cultural change in the behavior of more and more people, who will gain trust and empowerment, while working together in the recovery and preservation of their community.

Finally, it must be noted that the use of Participation Map and the Pathways for Social Design, are not only relevant for a better understanding of CULTIVA and its possibilities, but also for the reflection on the usefulness of these type of instruments that tend to remain underused. It is important to emphasize that CULTIVA is an open project, based on the creation of shared value, and built on crosscutting collaboration and co-design. Therefore, ideas, findings and feedback of different people in the coming months will be crucial to define the achievements and future direction of the project.

Paulina Cornejo Moreno Valle
Head of Social Design CENTRO University, Mexico
pcornejom@centro.edu.mx

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Dialogic Activism in a Collective Model of Design

Cathy Gale

Abstract

Historically, isolated modes of professional practice have been sought (and taught) as the route to hero status and commercial success in (graphic) design. This cultural-commercial system of validation is dependent on a competitive rather than co-operative emphasis within academic institutions, the design press and popular notions of the discipline. In an increasingly over-crowded field of students and practitioners such isolation diminishes design's intellectual, socio-cultural and political capital while perpetuating a state of anxious individualism. The emergence of creative collectives is explored in this proposal as an ideological shift and methodological antidote to the contingencies of current market-led practices in (graphic) design practice and pedagogy. Collective and co-operative structures represent new ways to overcome the limitations of isolated practice through cohesion and shared ideals for pragmatic cost-saving ends. This dialogic process of designing also forms a more participatory connection between stakeholders and communities in a more socio-political purpose. By embedding co-operative notions of design activism and political reflection into design education the power of multiple voices given written and visually-expressive form is examined as a knowledge-commons. The same persuasive pictorial strategies employed in graphic design to increase consumer engagement and gain commercial advantage are developed here as a form of visual rhetoric, seeking to provoke discourse and discover common ground. Accounts of collective and collaborative practice are drawn from art practice (the Guerilla Girls) and architecture (Assemble). From a pedagogic perspective, the Alternative Art School (AAS) is introduced as a student-led autonomous collective concerned with issues relating to contemporary design education and how current economic, gender-based, diversity, political conditions influence the production and value of design. The main purpose of the AAS is to raise difficult questions about the contingencies of art and design education and practice in the form of a collective: to use dialogic processes and design tools as methods of testing speculative alternatives to 'industry' norms relating to the lone design hero in a state of capitalist realism. A student-based exhibition 'Wall of Words' demonstrates how design debate can form a synthesis of voices expressed through design tools in a new mode of graphic authorship as a catalyst for community engage-

ment. Collective approaches to design are framed here as an untapped source of agency and impact derived from a synergy of diverse participants in a more collaborative and co-operative formation embodied by a growing community of (graphic) designers.

Theme: Alone
Keywords: graphic authorship, capitalist realism, design activism, collective paradigm, dialogic design

Co-:	a prefix meaning coming together (for a purpose)
Co-operative:	working side-by-side to achieve the same goals/ends
Collaborative:	working jointly on an activity or project, in more of a synergy than co-operation
Commons:	resources and/or systems created by and shared with a group or community
Collective:	diverse individuals forming a combined unified whole

1. Introduction

Historically, individual modes of professional practice have been sought (and taught) as the preferred route to peer group status and commercial success in design: a cultural capital that owes much to the field of fine art. Critical theories, media commentary and philosophical arguments have helped underpin art's intellectual and mystical position among the arts in certain social milieu, while institutional validation of the individual artist as a codified cultural personality is reinforced by international art biennials, national(ist) competitions and solo exhibitions in prominent galleries. However, focus on the named artist fails to acknowledge the interwoven co-dependent networks of the art world incorporating assistants, critics, dealers, gallerists, patrons, and audiences. Design disciplines mirror many of fine art's hierarchical systems supporting the cult of individual genius. Even though creative production is inherently team-based or co-operative in design, it is the figurehead or founder (as brand identity) who is most often credited with the work's originality and impact. This cultural-commercial paradigm is dependent on a competitive rather than co-operative emphasis, a model exemplified by academic institutions and the design press, filtering down to popular notions of

professional practice. Market forces drive difference as separation (your unique selling point) even further, while the commodification of knowledge itself contributes to states of isolated individualism amongst students in an increasingly over-crowded educational sector.

The recent rise of discourse around digital commons[1], community-based activities, and creative collectives signals a movement towards more widespread change in society of which design is a part. Whether design follows such shifts, making manifest new social formations through its tools and techniques or whether the discipline can lead by instigating a more vocal and visible argument for togetherness underpins the critical position of this explorative paper. Notions of collective identity and action are drawn from cultural and social theory, philosophy, artcriticism and interviews with contemporary collectives to form socio-historical threads linking established practices with emerging student-led research. Often in their own words the aims and experiences of collectives across art and architecture, such as Assemble and the Guerilla Girls are reflected on. These examples provide insights into the role diversity and fluid social organisation play in the most pertinent models of practice for today's complex social and economic needs. In rejecting andexposing entrenched preferences for the hero-artist anonymity and community are adopted as deliberate strategies, whether as a method ofdisrupting current capitalist inequalities, or for a more socially-orientated purpose. The shape and voice of each collective is determined by the participants' skills and aesthetic preferences, the geo-political environment of the group's formation, and its underlying aims.

As a flexible model, adaptable to each new configuration of members (internally) and to meet (external) audience needs, an initial framework for collective design is conceived as a (multi-disciplinary) group with shared interests who undertake activities together to achieve common goals. The collective may collaborate but this is not a defining component of the social unit. Instead a dialogical method of developing a collective practice is considered by drawing on sociologist Richard Sennett's (2012) theories on co-operation. In a dialogic discourse "a conversation [...] does

1 The digital commons, incorporating open-source software, extends the possibilities of conversation and community even further, unlimited by the earth's finite natural supplies, enabling new more fluid forms of social communication and collaboration. Social media has however been widely criticised for exacerbating teenage peer-pressure, misogyny, racism, political extremism and intolerance.

not resolve itself by funding common ground" but allows and values difference and indeed conflict as a dynamic component of the collaborative process (Sennett, 2012: 49).

Due to the embryonic nature of the subject, the design collective is not presented as a chrono-logical stage in design's evolution, a clearly-defined model, or set of rules, but as a contribution to debates around future models of inclusivity and togetherness. As such, there is a strong pedagogic emphasis to this research in which the tutor is framed as a catalyst for a critical collective design in collaboration with students. Student participants are guided by the tutor (as co-researcher) towards re-envisioning design paradigms in their own terms, through dialogic discourse and participatory events. Graphic design forms the focus of this research-based pedagogic project, based on my role as senior lecturer in the subject, a discipline conceptualised as an expanded practice. On the one hand this pedagogic intervention represents an antidote to the exponential increase in student anxiety that has been brought on by unavoidable financial burdens and overarching pressure to achieve success. On the other hand, the educational crucible is a transformative space for the designers of our future, enabling an intellectually-infused, creatively expansive environment for discourse and explorative practice.

Two inter-connected examples of collective teaching and learning are outlined here: the Alternative Art School (AAS) is introduced as a student-led model of co-designing and identity in pedagogic practice at undergraduate level (currently in its third year). The AAS is an educational experiment in forging a knowledge-commons – an idea developed by Charlotte Hess and Elinor Ostrum (2007) – for (enrolled) students invested in the collective potential of learning. Features of this social unit incorporate non-hierarchical structures of planning and practice, autonomy, reflexive production, and shared authorship. The second account briefly illustrates how the AAS worked in collaboration with typography students to curate a collective exhibition, the 'Wall of Words', in which graphic tools and artefacts are tested as embodiments of design debate, forming a visual synthesis of diverse voices. The role of semantics in framing individual genius as the primary target for the artist and designer is proposed as ripe for revision. How can we advance the structural, conceptual and linguistic changes required to facilitate collective models of design education and/in practice in which the inter-disciplinary collective is interrogated as a positive social force, which embraces otherness? To contextualise a new mode of collective graphic expression, the next sec-

tion starts with an evaluation of authorship and group identity as counterpoints to the traditional celebrity status of the lone designer-creator.

2. Authenticity / Authorship / Anonymity

The relationship between authenticity and authorship in the arts and crafts can be traced back to the use of maker's marks for traded goods. Trademarks have existed for at least 5,000 years and can range from ceramic marks to cattle branding: in *Marks of Excellence: The History and Taxonomy of Trademarks* Per Mollerup (1996) identifies social identity, ownership and the geographic origin of the maker as key statements of these visual devices. Alphabetic marks often derived from signatures have been transformed over generations of makers into signs loaded with cultural symbolism. These conventions converge business trademarks with personal signatures, family and brand identities. The value added to the *artist's* signature can be identified as early as Renaissance Italy, according to Ellen Mara de Wachter's (2017) *Co-Art: Artists on Creative Collaboration*. She cites specific reference to the genius of the artists' 'hand' being made in a 1445 contract between a patron and Piero della Francesa (de Wachter, 2017: 7). Symbolic value is attributed, here, to the distinct figure of the author-creator himself in a conflation of romance and mystery, overlaid with an exotic otherness. Any input from another hand (or evidence of another signature) in the production of the artwork, therefore, diminishes the cultural and commercial currency of the piece, and the status of the artist himself.

Art is deified in Emmanuel Kant's (1790) *Kant's Critique of Judgement* as purposeful but without a function, created by a singular genius. Framed by the early stages of the industrial revolution in Europe, the one-off artwork is differentiated from design and craft objects, which are produced for everyday use. In Walter Benjamin's 1999 essay 'The Work of Art in the Age of Mechanical Reproduction' in *Illuminations* a transformation occurring in the traditional conception of the artwork's power is identified. Traditionally associated with a magical or mysterious power arising from its presence in time and space, Benjamin's notion of artistic aura relies on distance bet ween the reader/audience and the otherness of the work of art. The value of art is diminished in the modern realm of mass-production because the artwork is so easily reproducible – and therefore disposable – a realm of creative yet functional production conceptually associated with design.

In the early twentieth century a number of artistic 'isms' formed around shared aesthetic embodiments of dynamic socio-political ideas, often explored and expressed through new (industrial) tools of communication. Movements such as Futurism, Surrealism, Russian Constructivism and Dada brought diverse artists and writers together around common goals and a set of principles often put to paper in the form of a manifesto[2]. Yet these groups were not flat structures or equally-weighted. Led by dominant personalities, participants featured as named artists rather than subsuming individual identities and egos under a collective identity. The diversity of each movement's membership only stretched so far: the common path in these avant garde groups was only fully available to certain participants. Denied contributions to joint shows and diminished in historical narratives as wives, girlfriends or (silent) muses of the more prominent male artists, their female counterparts often failed to benefit from the potential empowerment offered by the collective social organisation. Reinforced through the inherent historical bias in critical commentary, marketing and mass-media, many collaborative works have also been attributed to one (usually male) artist, in patriarchal deference to the hero-creator.

State-sanctioned art movements such as the highly individualistic[3] Abstract Expressionism in the USA were commercially and culturally framed as 'an antidote' to a kind of creative collectivism observed in eastern bloc communist organisations during the cold war (de Wachter, 2017: 8). In his essay 'The Growth of the Commons Paradigm' David Bollier (2007: p.27) argues that American moral panic over communism and its associated socialist aims problematizes collective-management regimes as harmful, if not destructive of individual freedom of expression.

2 The collective signature as a powerful creative component of the artists' collective/group is intrinsic to the artists' manifesto. The collaborative crafting, confirming (through the act of signing), and disseminating the manifesto forms a public declaration of a group's internally-devised ideologies and future purpose. The Penguin 100 Years of Artists' Manifestoes provides a fascinating insight into the individual and collective manifesto. That the manifesto still has significance across art and design disciplines of design is evident in the Montreal Design Declaration issued at the World Design Summit in 2017 and the Ico-d Design Education Manifesto (2000/11).

3 Jackson Pollock's work was described as 'symbiotic' in its collaborative nature with wife Lee Krazner (de Wachter, 2017); Charles Eames was commonly afforded the majority if not sole credit for work produced in partnership with his wife Ray; Jeanne-Claude has only recently gained recognition as the collaborative partner in many of Christo's artworks.

He claims that, “American political culture is a dedicated champion of the ‘free market’, after all. It celebrates the heroic individual, the self-made man, not the community” (Bollier, 2007: 27). While Bollier’s essay has an environmental and ecological focus to his notion of the commons, his critique of market forces is adaptable to the conditions of design, which are contingent on a matrix of technological, ecological informational and social concerns. The next section will focus on two creative collectives that embody positive and proactive alternatives to the lone genius paradigm in art and architecture.

4. Collective Creativity in Action

Despite the hierarchical structures of capitalism interest in collaborative or co-operative communities of practice have gained momentum in recent years as a mode of artistic practice, graphic agitprop and architecture. The Guerilla Girls are a self-proclaimed collective that has successfully challenged gender and racial bias in the art world and gallery system, in the form of a shared authorship. Prompted by the dearth of women in the 1984 MoMA exhibition show in New York, ‘International Survey of Painting and Sculpture’ this collective for ‘a new kind of activism’ (de Wachter, 2017: 25), initiated a new wave of political visual expression, including a resurgent feminism. For the Guerilla Girls, the concept of the individual genius artist is outdated but preserved by an art market, which inflates (and conflates) the commercial and cultural value of both artworks and artists. Such reverence is flawed however, in their words: “The art world is increasingly about power and money. Along with that comes discrimination, exploitation and income inequality. Much of what is wrong with the rest of the world is wrong with the art world too” (Guerilla Girls, 2017: 25–29). Through their creative activism they seek to challenge the status quo and work towards change resulting in a more truthful reflection of cultural diversity and social complexity in contemporary life.

Comprising fifty-five anonymous members since its inception, anonymity is adopted as a strategic rejection of individual identity: pseudonyms (of usually dead female artists) are adopted and gorilla masks are worn to exploit the freedom of their alter ego’s voices[4]. By deferring attention from the named artist to focus on the collective identity the

4 The need for female-led or feminist groups to adopt anonymity or disguise as a strategy is an area worthy of further research.

group's message gains primary significance. For the Guerilla Girls, the collective "paradigm fills a theoretical void by explaining how significant value can be created and sustained outside of the market system" (Bollier, 2007: 29). The graphic language of their campaigns employs bold display typefaces with collaged fragments of classical art, adding force to their arguments through the dynamic aesthetic simplicity of advertising. Collective action in this context synthesizes the creative process within the outcome/artwork.

Collective approaches to living and working are growing in architecture to fulfil an increasing need for (affordable) housing in urban centres, as scarcity leads to social unrest and urban isolation. No longer operating as liminal activists, the inhabitants and architects are actively co-designing alternative developments to conventional nuclear family units. In this way, architects are taking a lead in developing collective design for everyday life. Formed in 2010 by a core group of fifteen who met while studying architecture in the same year group, discursive friendship is stated as a unifying core identity of the architecture and art collective Assemble. Underpinned by a social ethos rather than a style or aesthetic sense Assemble were inspired to do something together after graduating to satisfy an interest, to gain more agency and explore alternative routes to the 'unchallenging' realities of professional practice.

Assemble is conceived as a knowledge-commons providing an ongoing educational resource for those involved, absorbing specific skills as required by each context and project (de Wachter, 2017: 183). The knowledge-commons is defined by Hess and Ostrum (2007: 7–8) in *Understanding Knowledge as Commons: From Theory to Practice* as, "all intelligible ideas, information, and data in whatever form in which it is expressed or obtained… all types of understanding gained through experience or study" including craft and technical skills, scholarly and non-academic knowledge. This London-based architectural commons is devised as a complex techno-social system of exchange and experience, which is embodied in the human library or living depository of a community or collective. Assemble maintain a deliberate anonymity, preferring a collective identity and rejecting requests/demands to publish a list of individual member's names: "a group of individuals who act and speak with one voice, that then collaborates with other entities, rather than a group of individuals collaborating with each other within our own group" (Assemble, 2017: 187). The financial benefits of spreading costs by working collectively during their first commissioned project helped to

unify the founding group of friends further through pragmatic expediency. By winning the Tate's Turner Prize in 2015 – the first collective to do so – Assemble not only garnered institutional validation for this model of artistic practice but enabled them to exploit this cultural and commercial recognition to push for more projects and funding. For instance, they created a greenhouse space between two knocked down houses which would have been impossible without the rewards of the prize.

The field of collective action is *internal* (within the design group itself) and *external,* within social contexts, which are open and participatory: internally the collective process forms a micro-community of participants acting as a group to achieve certain aims. Through collective action, internal (Assemble) and external (local community) systems are connected for socio-economic benefit with flexible team members activating the multivalent touch points required for the audience or local community. Collective action is defined by social theorist Alberto Melucci (1995: 62–63) as "a process continuously activated by social actors... Providing an account of the plurality and tensions constituting a collective actor, collective identity, is a cognitive tool for this learning process". In this way members of the collective instigate social shift as an intentional component of the creative process in dialogue with the (external) audience/community. This negotiated social relationship[5] owes much to French theorist and art critic Nicolas Bourriaud's (1988) *Relational Aesthetics*. For Bourriaud, relational aesthetics are open-ended, negotiated with an audience or community and responsive to the contributions of the participants. His tendency to feature designers and architects into his critical framework has arguably enabled the conceptual territory, creative methodologies and outputs of design and architecture disciplines to be reconfigured in a par with traditional notions of art[6].

In this section anonymity or shared authorship has been considered as a strategy which facilitates a common purpose, but also mitigates against the diminishing consequences of gender bias, for instance. In

5 Comparisons can be identified with art and architecture collectives working in a relational or dialogic process, such as the feminist Matrix group of the 1980s, and Muf, founded in 1994.

6 Many parallels can be drawn with Activity Theory, rooted in the works of Vygotsky, Leont'ev and Engeström. Here, people are socio-culturally embedded actors considered as part of an entire work/activity system accounting for environmental impact, socio-cultural history of the person, the role of the design artefact, the designer/architects' motivations, and the overall complexity of real life action.

these social structures difference conceptualised as diversity enhances the knowledge-commons, providing depth and specialist skills to ambitious projects which would be time-consuming or expensive without this collaboration and co-operation. By contrast, solitary working environments, "lack the creative interaction, spontaneous brainstorming or critique that happens in shared studios or just general day to day exchanges of a communal workplace" (Vaughan, 2012: 11). The spatial connection of a shared workplace has clear social, creative and financial benefits.

The boundaries of design are intellectually and socially blurred in these spaces to generate new knowledge across the commercial and civic spheres of practice. The creative collective is inclusive in character with porous boundaries, which invite new relationships to be formulated internally and externally. The next section considers the critical context of collective action for creative communities, acknowledging the global diversity of design, but focusing on the most immediate and familiar conditions of contemporary capitalist democracy.

5. Collective Action / Capitalism & Collectivity

As the Guerilla Girls claim, the artworld is subject to, or even determined by, the opportunities and limitations of the free market. Freedom in this context is derived from notions of an idealized economic system in which prices are determined by supply and demand in unrestricted competition between privately owned businesses.

While the art market arguably mirrors consumer culture at large, (graphic) design plays a far more embedded role in its construction (Poynor, 1999). Design, advertising and film form persuasive cultural processes which work to present our world to us, often in idealised terms, to reinforce and normalise modes of consumer culture and behaviour. Indeed, design has created demand for its own services, "through the excessive production typical of market expansion" (Moline, 2012: 123). This has undoubtedly increased the popular profile of design disciplines in the public domain and consumer culture but the associated rhetoric of technological and economic progress has narrowed the terms in which design is framed to the commercial sphere alone. For Sennett (2012: 8) modern working environments exacerbate the limitations of the free market with temporary contracts leading to superficial relations within institutions, reinforcing the silo effect. Mark Fisher takes this idea further in *Capitalist Realism. Is There No Alternative?,* where he claims that "capi-

talism seamlessly occupies the horizons of the unthinkable… [leading to a] widespread sense that not only is capitalism the only viable political and economic system, but also that it is now impossible even to imagine a coherent alternative to it" (Fisher, 2009: 11).

This is a problem for design because the reductive tendencies of capitalism obliterate alternative approaches to education and professional success, and diminish the significance of socially-orientated strategies for no personal gain. Current states of mass social anxiety are the result of a capitalist fear of otherness, according to Sennett (2012), leading to a reduction of stimulation by difference and unwillingness to embrace diversity. Instead, a neutral language of architectural style and form, popular culture, hotel and airport design, graphic communication, and high street shops are sought (Sennett, 2012: 8). What is needed (Melucci, 1996) is a shift in the language used around collective action to focus on the underlying principles and words employed to devise and describe new design paradigms. New terms can reframe contemporary design practice in a more socially-orientated sphere, illustrate how the effects of global capitalism have exacerbated the cult of individuality and genius in the arts and design, and in-so-doing expose its limitations.

Contemporary society is increasingly complex, globalized and fragmented. The effect on students includes increasing anxiety among young people overburdened with pressures of popularity (social media) and success (high achievement or bust) and financial debt (student fees). Even the connections via social media and the digital commons are not as cohesive and emancipating as they appear, underpinned as they are by the commercial exploitation of personal data Melucci (1996: 91). The multiple demands made on young creatives underpins the necessity of testing alternative collective and collaborative models for design practice.

6. Alternative Art School: A Pedagogic Model of Collective Designing

Many designers share studio spaces and resources (print/digital), whether seeking an alternative to excessive rent, to develop interdisciplinary practices or simply to extend the social network of exchange and belonging encountered at college, as identified by Assemble. Within the Alternative Art School co-operative and collective conceptions of the design group/agency are defined as a 'situation' which enables a field of shared action (Melucci, 1996: 16). Collective action is framed as "the presence

of decision-making mechanism, the setting of goals, the circulation of information, the calculation or outcomes, the accumulation of experience, and learning from the past" (Melucci, 1996: 17). In this context, the processes of discourse and production are framed as meaningful outcomes. Staff and students are both actors in the structural organisation of the collective, co-researchers in the productive philosophies of the socio-creative unit.

The Alternative Art School (AAS) was devised and tested in 2015 as a student-led autonomous collective concerned with issues relating to contemporary design education. Through collective belonging and a flattening of (horizontal and vertical) power-relationships at university the students' sense of agency is awakened and collective action is provoked. Working within/beside institutional systems (curriculum, timetable, self-managed time) the self-selected group is challenged to reconfigure their own motivations and pressures within the course and college. By repudiating the dominant narrative of individual genius, the AAS create more space to think through social relations, to manipulate or subvert expectations of success, and to bring about cognitive change.

The 'school' is introduced informally into the second year undergraduate graphic design degree programme as a dialogic mode of design research co-created with the tutor (fig.01). Dialogic discourse is defined in the educational context as an open-ended space in which debate can take unexpected directions in the process of seeking common ground (Sennett, 2012: 19). Collaboration within the artists' collective may be 'hard work' (Guerilla Girls, 2017), exposing the tensions of individual practice in a collective or collaborative context, but follows a familiar design process of brainstorming, idea generation, definition of the message and means of communication.

Concerns tackled by the group have ranged from the micro level – inadequate studio space, print and digital resources, canteen food – to more macro issues, such as the critical implications of socio-economic policy on state education, gender bias in the design industry, a lack of diversity, and the de-valuing of the arts subjects in (UK) schools. All content, aims and outcomes are built by the group with tutorial support through dialogic debate in neutral environments (cafes, bars) to help establish a common ground[7]: identifying agency and freedom and decid-

7 For more, in depth information on the Alternative Art School, see Gale (2017) '#AlternativeArtSchool // An Interstitial Space for Creative Dissent'

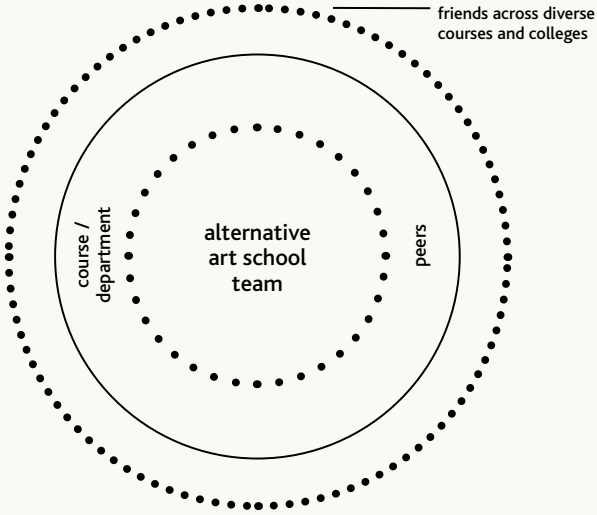


Figure 1. A diagrammatic sketch of the Alternative Art School as a unit within the college and broader community of design

ing what to do with it. Autonomy is introduced through workshops comprising critical analysis of power structures within academia, the design industry, society and politics. Movement of the roles within the group (minute-taker, leader, maker) and beyond the immediate circle (fig. 1) creates new conceptual and discursive spaces. The shifts in hierarchy and fluctuations in the community of practice have allowed responsibilities and activities to be tested. A remarkable level of ownership, maturity and equality is established that bears no relationship to more entrenched social positions observed in the design studio. For Etienne Wenger (1999) the community of (design) practice produces meaning through the participatory process of design*ing*: the Alternative Art School is, thus, a community which is permeable at its edges to enable far more fluid entry and exit, participation and reflection.

This commoning network is managed by a core group of students who re-create and reconfigure the collective every time they meet and devise new inter-disciplinary points of connection. Their collective identity is substantiated by core convictions, such as the rich social attributes of studio culture, concept-based actions, critical discourse as shared power through a knowledge-commons, and alternative approaches to teaching and learning design as an act of negotiation. The processes and outcomes of this collective are given visual form to provide diverse audi-

ences or participants intellectual access to new ideas and social structures. A series of events in which the debate itself or reflections on this social unit are made public – to test the potential and limitations of the collective – and put in place at intermittent stages in the academic calendar. The collective has been invited to participate in panel discussions at London design festivals, to devise and lead school workshops, to lead academic conference workshops and exhibit in the public domain. The symposium and exhibition format represents an opportunity to demonstrate collective action to student peers and the general public. The student-based exhibition 'Wall of Words' demonstrates how design debate can form a synthesis of voices expressed through design tools in a new mode of graphic authorship as a catalyst for community engagement.

7. Wall of Words: Visualising Dialogic Debate

Derived from one of the Alternative Art School's (AAS) symposia, fragments of debate and notes produced during breakout sessions in workshops formed typographic gifs produced live on the day, then projected to the participants. These texts were later developed in collaborative workshops between the AAS team and students in the Type elective to capture the day's debate for a wider audience within and extended from the university network, in the form of an exhibition of posters. Both the GIF and poster formats were exploited as promotional tools, which enabled all design (fig.03) collaborators to contribute as one of many diverse voices and interpretations of the same event.

Limitations, such as the time of year of the show (January: dark, cold; tired students finishing dissertations) were exploited in the form of print processes (riso) and material format (A2). The constraints of the riso process (limited availability of colours) led to three colours being chosen and agreed by the team (flourescent pink, yellow and blue) to draw attention to the messages in the show (fig.2). The same persuasive pictorial strategies employed in graphic design to increase consumer engagement and gain commercial advantage are developed here as a form of visual rhetoric, seeking to provoke discourse and discover common ground from the wider college community. This collective represents a powerful alternative to Fisher's (2009) term 'reflexive impotence' used to describe a phenomenon where (young) people recognize the flawed nature of capitalism, but cannot identify the methods or space for effecting change.



Figure 2. Posters from the Wall of Words exhibition, designs by level 5 graphic design students

By embedding co-operative notions of design activism and political reflection into design education the power of multiple voices given written and visually-expressive form is examined as an ongoing knowledge resource, passed down from one student cohort to the next. As each iteration of the Alternative Art School has evolved, the model, methods and outcomes have gained in significance. Ultimately it is anticipated/hoped that these collaborative and co-operative models of design practice will extend to professional contexts reconfiguring the isolated paradigm of singular genius in preference for more collective modes of socially-orientated design.

8. Conclusion

The emergence of collective and collaborative discourse gives currency to the historical narrative of social shift and productive action. If we want tomove forward together we need to take advantage of the spread of discourse around the commons, collaboration and collective action by abandoning the distorted historical models of hero designer-leadership.

In this paper the Alternative Art School has been introduced as an example of collective action in pedagogic practice: an educational experiment in forging a knowledge-commons. The collective value of design is made identifiable to the students through the artefacts and messages that give voice and visual form to spaces between commerce and culture. If design is to follow a common path we need to differentiate from similarity has led to many official or unofficial co-operative societies which have been based on exclusion as a mode of creating and sustaining power, through elitist structures and tacit access rituals, delimiting difference in terms of class. In an organic sharing of resources – conceptual, creative, pragmatic, experiential – the co-operative or collective design group resists the singular author or 'celebrity' status that many designers and architects have sought for personal gain. In promoting the value of dialogic and collective design a common lexicon may be necessary as an adaptable set of terms and tools to inscribe and enable inclusive discourse around the commons and collective design and to move forward together. Not only are more design collectives needed as models of best practice, the conventional notions of the lone creative hero must be challenged and alternatives framed as desirable within the commercial and cultural systems of the arts and design.

Cathy Gale
Senior Lecturer, Design School,
Kingston University, UK
c.gale@kingston.ac.uk

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Design, craft, city
Architecture without volume

Claudio Gambardella

Abstract

Architecture, as for the architects, specialized journals and a large part of the academic world happens with the building. It can be pictured, indeed, the overcoming of the idea of architecture as a construction, opening up to new forms of 'participation' to be experienced in particular in the peripheries.

It is understandable, therefore, to think about 'Architecture without volume', programmatic synthesis, with a little of special effect, ofthis cultural attitude, if a motto is somehow wanted. It is not just amatter of drastically contracting the construction of new buildings by choosing a large-scale reuse of the already existing ones but to convey, through unforeseen or underestimated design approaches, a new sensitivity which shall prefer, to the violent and a bit macho-styled gesture of the predatory business, the culture of mending suggested by Renzo Piano.

The same idea is thus awakened by Richard Sennett's studies, and a new participation arisen from the ashes of the work of Giancarlo De Carlo, which nowadays expresses itself through manifold forms of re-appropriation of the urban space.

It isn't about designing in a void to fill it in, indeed of creating with sartorial techniques novel physical, aesthetic and functional relations between empty space and existing buildings. It means caring of the connections and reconciliations between parts of an urban system, including micro dimension – i.e. a district, a lot, a street – shifting the attention "from objects to relationships", as Gregory Bateson argued in his psychotherapy studies, to induce that beneficial epistemological leap from the form to the process.

Riccardo Dalisi, who has been inserted only few weeks ago in the permanent collection of the Parisian Centre Pompidou, can be considered a forerunner of an architectural design made using wasted things, the objets trouvée, the hand-made. One of Dalisi's works lasting a sign in the city of Naples was the one for Rua Catalana. Metallic sculptures and street lamps, generated from the collaboration with the blacksmiths who have been working since ever in the workshops of this ancient street, have been placed on the facades of the buildings. Thus, the urban space does not show the signs of modification only on the skin of its edifices. Transformations aren't outside but internal to the city, due to the intense dialogue, consistent, structured between designer and craftsmen/residents of the neighbour-

hood. Craftsmen with this operation have been sustained in improving the quality of their business, have had the chance to be noticed and appreciated by new customers, above all by architects.

Exhibitions, conferences, essays and books have brought further notoriety to the designer of "the Neapolitan coffee maker by Alessi" and have made famous the artisans themselves. These transformations alter the space, the quality of living, the work and its dignity; they affect as well the economy of a neighbourhood, which has always supported with participation and sympathy the work of Dalisi as well as its craftsmen. 'Non-volumetric architecture' can therefore be interpreted through a resizing process, in a subtle design project in the city, delicate, clever, participated, 'poor', never miserable.

Theme: Alone
Keywords: co-design, reuse, architecture

1. Introduction

The 'limitlessness triumphant' is the prevailing and distinctive condition of the modern man; and somehow the West imposes a culture of the limitlessness, that spreads pervasively and widely in the planet, actually becoming the driving force behind a 'religion of the economy'.

'Religion of the economy' and 'culture of the limitlessness' mutually feed themselves, creating a lethal combination. Serge Latouche (2012), the guru of the degrowth, delineates the character of the modern man, speaking of his "conviction to be able to boundlessly produce" and of the "right to enjoy without any obstacle", thereby to get rid of "the straighjacket of the ethic" and abolishing "all the rules on which the life of a society used to rest".

The 'land consumption' can be easily read as a consequence of this attitude: the building activity, uncontrolled and realized in the wrong places, is the true cause of damages and victims of some so-called "natural catastrophes", yet the stream of cement doesn't stop itself, keeps on consuming ground and devouring the planet.

According to the LUCAS investigation (Land Use/Cover Area frame Survey), conducted by Eurostat in 2016, Italy has the fifth highest rate of ground consuming in Europe, following Netherlands, Belgium, Luxembourg and Germany.

Moreover, according to the data obtained from the monitoring network of ISPRA, the Italian Environmental Protection and Research Institute, of Republic of Italy, and the ones collected from the Environmental Protection Bureaus in Regions and Province Autonome, soil consumption in Italy has eroded around 21.100 square kilometres, passing from the 2,7% of the 1950s to the 7,0% esteemed for 2015, and increasing of 4,3 percentage points, with a growth of 159% (1,2% further between 2013 and 2015).

Certainly, several years after and consistent with the EU targets established in 2011 (Roadmap to a Resource Efficient Europe), in order to achieve by 2050 the goal of "zero land use", in May 2016 the Italian Chamber of Deputies finally approved a special Draft Law (D.d.L 2039 "Containment of land consumption and reuse of built-up land"), for the valorization and the reduction of the consumption of soil, intending this latter as a common good and a non-renewable resource, but the damage is done, and is invaluable.

2. Architecture without volume, discourses and a case studies

Architecture seems to represent the most evident synthesis of this problem, with its monuments to globalization that reach even the outermost areas of the planet. Then, how does the Culture of Design address this issue? Which side is it?

As for the architects, specialized journals and a wide part of the academic world, architecture happens with the building. Any other opera(c)tion, that not constitute itself as a building object, shall remain mostly on the sideline, or even overlooked. Aaron Betsky, who was director of the 11th International Exhibition of Architecture at La Biennale in Venice (2008), called Out There: Architecture Beyond Building, with a far-sighted approach already proposed to rid architecture of buildings, as he declared:

> "Buildings in fact are not enough: they are the grave of architecture, what's left of our desire to create a different world, a better environment, open to new possibilities beyond everyday routine. In pragmatic terms architecture is what is able to let us feel 'at home' in the world." (Betsky, 2008)

Eight years after, during Reporting from the front, the 15th International Exhibition under direction of Alejandro Aravena, the President Baratta

highlighting the “increasing disconnection between architecture and civil society”, that seem to characterize our time, also intended to seek “encouraging messages”, as he declared:

> We are not interested in architecture as the manifestation of a formal style, but rather as an instrument of self-government, of humanist civilisation, and as a demonstration of the ability of humans to become masters of their own destinies.” (Baratta, 2016).

At the end of the Exhibit, Baratta moreover proclaimed:

> “Aravena’s exhibition will be remembered: he has built very stimulating occasions of reflection on the possibilities of the civil society to organize better the space of its own development in the centers and in the outskirts of the world”.

Through the pavilions of some Countries, it was possible to think about two important themes: the active involvement of the inhabitants on one hand, on the other on the relational character of public spaces. Between the two exhibitions, it could be pictured a sort of methodological bridge, the idea of overcoming architecture as a construction, opening up to new forms of ‘participation’ to be experienced particularly in the peripheries. The field of choice it should be a certain kind of Urban Design, or more properly, of the Urban Interior Design, as is not surprisingly named one among the masters offered at POLI.Design (Milan), that has as challenge and target the attention to the connections in the urban fabric, to the interstitial spaces between the elements, to the “project in an urban void”. We can think of Jaime Lerner and his idea of “urban acupuncture”: as in the traditional Chinese medicine, in which the interaction between physician and patient is crucial, this approach takes care for spots of the sick city, “viewed as a multi-dimensional sensitive energy-organism, a living environment”, as the Finnish architects Marco Casagrande, one among the first to apply these principles explains on his website. The full ‘recovery’ can be achieved thanks to the necessary dialogue among two subjects, when in the patient it is decisive the wish to get free from illness, as for the inhabitants it ignites the desire of the renewal. In this sense, they are multiplying the experiences of “urban acupuncture” conducted during the last years throughout the world, as indeed Jaime Lerner did in Curitiba, which is considered the more “green” reality of whole Latin America (Lerner,

2014). It could be considered also the work of Julien Beller, who builds ephemeral architectures taking over again abandoned spaces in the different European cities, recently involved by Anne Hidalgo, Mayoress of Paris, to realize the first reception centre for 400 refugees in an ex deposit of the railroads at Porte de la Chapelle, fully integrating it in the city. Furthermore, they are to be taken in account two among the twenty project displayed during the Biennial Architecture 2016 in the Italian Pavilion, entitled Taking care, designing for the common good. They were the project Estonoesunsolar, coordinated by the architect Patrizia Di Monte in Saragoza, and the Farm Cultural Park of Favara, in Sicily. This latter is an Independent Cultural Centre, born thanks to a couple of professionals, whose intuition and involvement made possible to save a piece of Historical Centre of the Sicilian town, otherwise condemned to be shaved to the ground, after the collapse of a villa in 2010, which also caused the death of two young victims. After the first two buildings were recovered and inaugurated in the same year of the tragedy, after only three months after the works started, the Seven Courtyards, as it is also named the Park, have become a place for contemporary art and design that, as intervention of urban acupuncture, is slowly improving the quality of the life in that area. In addiction, it also produces a new and healthy economy, with the creation of Farmidabile, a Cooperative of Community. During its first six years of life, contemporary art, architecture and public design have been surely the three predominant languages of this intervention of urban regeneration. This is the pivotal role of an architectural practice that refrains from creating new buildings, but is nor just the mere renovation of the existing. Art and design are not only the beating heart of the activities of the Farm, or parts of a strategic project, but themselves constitute the design process. 'Architecture without volume', therefore, becomes a catchphrase, the summary of this cultural attitude, if a motto is somehow wanted. It is not just a matter of drastically contracting the construction of new buildings by choosing a large-scale reuse of the already existing ones, but to convey, through unforeseen or underestimated design approaches, a new sensitivity which shall prefer, to the violent and a bit macho-styled gesture of the predatory business, the culture of mending suggested by Renzo Piano. The same idea is thus awakened by Richard Sennett's studies, and a new participation arisen from the ashes of the work of Giancarlo De Carlo, which nowadays expresses itself through manifold forms of re-appropriation of the urban space. It isn't about designing in a void to fill it in, indeed of creating with sartorial techniques novel physical, aesthetic and functional relations

between empty space and existing buildings. It means caring of the connections and reconciliation between parts of an urban system, including micro dimension – i.e. a district, a lot, a street – shifting the attention «from objects to relationships», as Gregory Bateson argued in his psychotherapy studies, to induce that beneficial epistemological leap from the form to the process. And beneficial not only in this sense, in the aim to develop new architectural languages, without performance anxiety.

The role of the design, of a certain way to conceive and to practise it, may encourage the practice of darning, a 'sartorial' approach to the project of architecture that comes off its perch to affectively get close to the true people, to the inhabitants with name and surname, to their lives and their things. Therefore, we are talking about an architecture that to be and to do can afford to rely on other ways of project, as a 'design of proximity' that, also due to its disciplinary statute, communicates more easily than architecture with people, with their movements, their gestures, with theirs way to act. They are not allowed to directly transform the buildings where they live, but rather they can customize the arrangement of furnishing of their houses, giving – even though in simple forms – a new sense to the domestic space. (abusiveness --- the superfetation of project)

Riccardo Dalisi – whose works since October 2017 are permanently displayed at the Centre Pompidou, in the Room 12 devoted to *Design and poor techniques around the Global Tools* – is an architect, designer, artist and Neapolitan university teacher, awarded the Compasso d'Oro ADI in 1981 for his research on the Neapolitan coffee-pot, and the Career Compasso d'Oro in 2014. Frequently contributor on important journals as *Casabella*, *Domus* and *Spazio&Società*, the periodical of Giancarlo De Carlo with whom he interwove an intense dialogue on the to both dear theme of the Participation, Dalisi can be considered a forerunner of an architectural design made using wasted things, the *objets trouvée*, the hand-made. The existing building itself is fine as it is, it has only to cover its surface with a skin of poetic fragments made with poor materials, and turn into a 'project superfetation', as in his experience during the years 1980s in the courtyards of Ponticelli, another Neapolitan district where he worked for a long time during the years 1980s, as university teacher as far as a professional.

Dalisi's long and continuing, experimental work of 'animation' in Naples started with the children and the elders called in the years 1970s "urban underclass", departing from the Traiano ward and hitherto continued in other suburbs of the city. Today, in accordance with the reflections above, his inheritance could be re-read as a case of 'urban acupunc-

ture' *ante litteram*. In this case, the relationship is not only among physical parts of a city or between its inhabitants: it assumes a self-educational, maieutic value of a relation between architect and community. Dalisi loves to remember that many of that children, met once they have become adults, revealed him that those experiences lived with him and his students of the university in Naples, saved them from a dangerous life.

And this is somehow also the thought of Aravena, when as curator of the Biennial Exhibition he explained:

> "We believe that the advancement of architecture is not a goal in itself but a way to improve people's quality of life. Given that life ranges from very basic physical needs to the most intangible dimensions of the human condition, consequently, improving the quality of the built environment is an endeavour that has to tackle many fronts: from guaranteeing very concrete, down-to-earth living standards to interpreting and fulfilling human desires, from respecting the single individual to taking care of the common good, from efficiently hosting daily activities to expanding the frontiers of civilization." (Aravena, 2016).

One of Dalisi's works more lasting a sign in the city of Naples was the one for Rua Catalana. Metallic sculptures and street lamps, generated from the collaboration with the blacksmiths who have been working since ever in the workshops of this ancient street, have been placed on the facades of the buildings. Thus, the urban space does not show the signs of modification only on the skin of its edifices. Transformations aren't merely skindeep, but internal to the city, due to the intense, dialogue, consistent, structured between designer and craftsmen/residents of the neighbourhood. Dalisi even opened a shop, where they were sold his object, such as coffee-pots, lamps, little sculptures and so on, realized by the tinsmiths of Rua Catalana.

With this all-around operation, which had also the support of the Region Campania, of the Municipality in Naples, of the National Confederation of Craft and of the same Street University founded by Dalisi-craftsmen have been sustained in improving the quality of their business, have had the chance to be noticed and appreciated by new customers, above all by architects.

Exhibitions, conferences, essays and books have brought further notoriety to the designer of "the Neapolitan coffee maker by Alessi" and have made famous the artisans themselves.

3. Conclusions

These transformations alter the space, the quality of living, the work and its dignity; they affect as well the economy of a neighbourhood, which has always supported with participation and sympathy the work of Dalisi as well as its craftsmen. 'Non-volumetric architecture' can therefore be interpreted through a resizing process, in a subtle design project in the city, delicate, clever, participated, 'poor', never miserable.

This could be the start of a new period for Architecture that shows to know how to downsize itself, to hold off its insatiability, to backtrack and self-contain its greed, after the last forty years during which has taken place "La Grande Bouffe", and finally prove its willingness to self-regulate, abdicating the self-reference and withdrawing the pervasive approach imposed by marketing and hidden wishes of Economy and Finance, "keeping it down" and making room for people. And all that not for undergoing a sort of a grey and sad penitential path, of mortification of the creativity, but, contrarily, to get rid from the oppressive, bulimic attitude that has estranged it from its Mission, from its imperative role as "social art", as once said Walter Gropius in *Scope of Total Architecture* (Gropius, 1962).

Freespace, the next International Exhibition of Architecture under the curatorship of the Irish architects Yvonne Farrell and Shelley McNamara, gives reason to hope that the 16th Biennial Architecture in Venice succeeds in reaffirming the relationship between architecture and civil society, as in the intention of the President Baratta himself, continuing the path opened with the previous edition.

Among the so many images suggested for their Exhibition, the two founders of Grafton Architects Studio have chosen to reassure us writing:

> "*Freespace* can be a space for opportunity, a democratic space, un-programmed and free for uses not yet conceived". (Farrell, McNamara, 2018)

Surely, it is a bold statement, somehow revolutionary, becoming even more explicit below, declaring:

> "There is an exchange between people and buildings that happens, even if not intended or designed, so buildings themselves find ways of sharing and engaging with people over time, long after the architect has left the scene". (Farrell, McNamara, 2018)



Figure 1. A corner of the Seven Courtyards of the historic center of Favara (Sicily) before the regeneration interventions for the creation of the FARM CULTURAL PARK (retrieved from https://www.farmculturalpark.com)



Figure 2. A picture of the same corner after opening the FARM. It is important to highlight that the regeneration of the existing buildings has been non-invasive and of a 'surgical' kind. The architects, therefore, preferred to operate using the white colour on the facades, according to the traditional Mediterranean architecture, and inserting in this place pieces of street furniture, objects and architectural details in the spirit of contemporary art (retrieved from https://www.farmculturalpark.com).



Figure 3. The entrance to the FARM CULTURAL PARK between two old buildings of the Seven Courtyards. In the middle of the picture, can be seen the black and white pattern that stands out on the regenerated wall. The short-circuiting between old and new is the conceptual feature of this intervention (retrieved from https://www.farmculturalpark.com).



Figure 4. FARM has also created the SOU at School of Architecture for Children. The outfitting is the result of a collaboration between Salvator-John Liotta (architect of the Laps studio) Maria Pia Bartoli Felter (graphic designer), Luca Mori (philosopher), Francesco Lipari (architect of OFL), Massimiliano Cerra (biologist) and Adriana Lo Curto (illustrator). to the project collaborated as well Charles M. Yurgalevitch, Director of the School of Horticulture in New York (retrieved from https://www.farmculturalpark.com).



Figure 5. Axonometric projection with the functions of the FARM (retrieved from https://www.farmculturalpark.com).



Figure 6. Riccardo Dalisi has reinvented design in Naples, re-discovering the handicraft of the city. His research on the Neapolitan coffee-maker was awarded the Compasso d'Oro award in 1981. Little time later, he was asked to design the Neapolitan for Alessi: a true project of industrial design.



Figure 7. The work of Riccardo Dalisi in Rua Catalana, with urban sculptures and street lamps made by the artisans of the ancient Neapolitan street. Ph. Sergio Riccio.



Figures 8, 9. Other views of the Neapolitan street, with the lamps and sculptures designed by Riccardo Dalisi and made by the craftsmen of Rua Catalana. Ph. Andrea Nuovo.

This reminds us, then, a step of thinking of Giancarlo De Carlo who, several years ago as noted above, as academician as well as director of *Space&Society* and designer devoted himself and his work to the themes of the Involvement in Architecture, stating as follows:

> "In my opinion, contemporary architects should their utmost in order the architecture of the next years becomes less and less the representation of who designs it, and ever more the representation of whom uses it."

Can we hope for this as in a prophecy?

Claudio Gambardella
Associate professor Department of Architecture and Industrial Design, Università degli Studi della Campania "Luigi Vanvitelli",
claudio.gambardella@unicampania.it

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System Designs for Arts Pedagogy

Amanda Morris, Wolfgang Muench

Abstract

Art and design education continue to resonate with modernist and avant-gardist ideas of artwork and author. However, during the transition from modernism to post-modernism in the 1960s, art forms such as happenings, intermedia and participatory arts established evidence that cybernetic and system-theoretical approaches to art and design education as well as artistic practices provided valid avenues for the realisation of collective art forms. Emphasis on processes does not necessitate discipline-specific definitions of an expected final outcome, but relies on the synergetic impact of the combination of diverse expertise and experiences of the participating members of the team. Results are created and defined as a consequence of constant communication and feedback between team members. For realisation and evaluation of such an approach the determination of a set of rules on which such a system is based is critical. This paper evaluates process-oriented pedagogy within a tertiary arts education organisation with a selection of case studies from LASALLE College of the Arts (LASALLE) in Singapore. These interdisciplinary pedagogical arts practices range from structured improvisation as a creative laboratory, use of technology to inform practice, playing with spatial geometries, through to creating templates to shape or codes to sequence performance and durational arts practice. The paper proposes a system design for arts pedagogy based on the potentialities of collective collaboration rather than the individual artist and on the multiplicity of outcomes made possible by focusing on process rather than product or object.

Theme: Alone
Keywords: arts pedagogy, process, system theory, interdisciplinary, collective collaboration

1. Introduction

Art and design education continue to resonate with modernist and avant-gardist ideas of artwork and author. However, during the transition from modernism to post-modernism in the 1960s, art forms such as happenings, intermedia and participatory arts established evidence that cybernetic and system-theoretical approaches to art and design education as well as artistic practices provided valid avenues for the realisation of collective art forms.

Jack Burnham proposed a conceptual framework for this new approach to artistic practice in the late 1960s (Burnham, 1968a, 1968b). His approach presented a shift from "an object-oriented to a systems-oriented culture" through emphasising process over object and final outcome. It challenged "the cultural obsession with the art object", traditional notions of the artwork as a "self-contained" object and a "finite source of information", and called into question the modernist perception of the artist as a sole genius (Burnham, 1968, p. 32).

These approaches reflected key arguments introduced by Norbert Wiener in the 1940/50s (Wiener, 1948, 1950) and Ludwig von Bertalanffy in the 1960s (Bertalanffy, 1967, 1968). Bertalanffy explained his General System Theory

> "as a complex of components in interaction, or by some similar proposition. System theory tries to develop those principles that apply to systems in general, irrespective of the nature of systems, of their components, and of the relations or 'forces' between them" (Bertalanffy, 1967, p. 69).

Emphasis on processes does not necessitate discipline-specific definitions of an expected final outcome, but relies on the synergetic impact of the combination of diverse expertise and experiences of the participating members of the team. Results are created and defined as a consequence of constant communication and feedback between team members. For realisation and evaluation of such an approach the determination of a set of rules on which such a system is based is critical.

Such process-orientated approaches disappeared after the 1970s and have never been re-introduced on a significant scale to art and design education since. Recently there has been a resurgence of interest in process-oriented approaches to artistic practice and education in art and design. This paper argues that a new approach in the observation of prac-

tices in art and design education that shifts the perspective from outcome-driven to process-driven provides new possibilities to re-think education in the 21st century.

This paper evaluates process-oriented pedagogy within a tertiary arts education organisation with a selection of case studies from LASALLE College of the Arts (LASALLE) in Singapore. These interdisciplinary pedagogical arts practices range from structured improvisation as a creative laboratory, use of technology to inform practice, playing with spatial geometries, through to creating templates to shape or codes to sequence performance and durational arts practice. At LASALLE practices have been informed by improvisation in all disciplines, the application of Anne Bogart's Viewpoints across disciplines, an interest in new writing, composition, choreography and creation through process and group engagement, connections between the visual arts and design and embodied performance practice, interactive technology, as well as installation art practices.

The paper proposes a system design for arts pedagogy based on the potentialities of collective collaboration rather than the individual artist and on the multiplicity of outcomes made possible by focusing on process rather than product or object.

This investigation into the teaching of process in contemporary arts evolved from the authors' observations of teaching through practice over the past six years at LASALLE. Qualitative research methods were employed, including structured surveys, written reflections and documentation of processes, as well as unstructured interviews and anecdotal discussion with academic staff, visiting professional artists and students. Documentation collected and analysed included recordings, photographs, field notes, programme notes and scripts from workshop and production processes. The research is at an early stage, with further work required to examine process-oriented pedagogical approaches at other practice-based arts institutions.

2. Case Studies

2.1 The Revolutionary Model Play 2.0, 2014–2015

This project enabled a collective collaborative approach, involving several companies with lead people contributing: these were Amanda Morris, Dean of Performing Arts at LASALLE, Ong Keng Sen, Director of the Sin-

gapore International Festival of Arts (SIFA) and the Beijing-based theatre director, Wang Chong and his company Théâtre du Rêve Expérimental as well as Ping Pong Productions. The process was iterative, taking place over two academic years, starting in August 2014, engaging students from Dance, Music and Theatre in research to investigate Mme. Mao's model plays from the Cultural Revolution, including visits from scholars and artists, such as Xue Jinghua, the lead dancer in the film, *The Red Detachment of Women*. The rehearsal process leading to the production in September 2015 in the Singapore Airlines Theatre, followed a traditional theatre process with leadership from the director, Wang Chong. However, the students were empowered to contribute to the content and shape of the new piece.

Acting students improvised scenes based on research into historical characters of the period, and the performance style and stories of the model plays. The students contributed to the text, including in their own languages. The students came from diverse cultural backgrounds, speaking English and seven other languages (Mandarin, Malay, Tamil, Tagalog, French, Korean and German). The sound of different languages punctuating the performance text created a system that universalized the human condition across countries and time and reflected the range of the students' socio-cultural backgrounds. Each student's contemporary response to the model plays, incorporated their native language and authentic voice (with English translation projected). The director brought in professional writer Zhao Binghao to finalise the script, but the writer was not the sole author of the script, which was genuinely a collective creation.

The interdisciplinary process also allowed for students to contribute as a collective during the performance through the use of technology. The project brought together the disciplines of film-making and theatre-making. Wang Chong is known for the use of live video in performance design, and the method applied for *The Revolutionary Model Play 2.0* wasto have the actors take turns as 'documenters' of history, so that the scenes were experienced by the audience as live theatre and also as live mediated projections onto a large backdrop consisting of newspaper front-pages from the period. The actors who had the role of filming the action on stage became co-creators of the mediated performance design as they chose the camera angles, the moments for close-ups and the timing and dynamics for the screen storytelling.

The collective collaboration generated a unique performance design (with red rain falling throughout). The result was a performance in which

boundaries of form and convention were challenged and crossed; multiple characters were performed, multiple points of view were presented and multiple languages used; while the lines between live performance and screen performance, between the real and the fictional, were blurred – ultimately leading the audience to question history and politics through a performance where the dramatic narrative was controlled by whichever performer/character controlled the camera lens. The project enabled collective collaboration, but is an example of a closed process and a closed outcome. While the project aimed for an outcome, a mediated theatrical experience to be presented as part of the Singapore International Festival of Arts, the research, rehearsal and final performance engaged with system approaches where process and collective creation were given priority over product, within a tertiary education context where the students were learning and being assessed.

2.2 Dracula: how I was able to face the mirror and realise that Living had become a chore, 2016

This collaboration between students and staff from undergraduate programmes in Acting, Animation, Fashion Design and Music started in January 2016, leading to workshop processes May to July 2016, rehearsal period August to September, followed by performance in the Singapore Airlines Theatre at LASALLE 27–30 October 2016. The genesis came from Stefanos Rassios, Lecturer-in-Charge of Acting, and Chris Shaw, Head of Puttnam School of Film and Animation, who wanted to explore an interdisciplinary process, where the form of the outcome was unknown, neither one discipline nor the other, and was therefore potentially a new discipline. In reflective notes, Rassios as project director was interested "to see what could happen when the brief was open – and not about providing a service to support a product" (Podesta & Rassios, 2017). Rassios and Shaw were keen to investigate the interdisciplinary process itself, to be open to different creative processes. However, they planned to embed the project within the curriculum, with students assessed on their work. Therefore, the two groups of students needed some structure; Animation students would produce animations, and Acting students would perform, but the process would not follow usual theatre or animation production processes.

Instead of starting with a narrative or written dramatic text, Rassios and Shaw decided that Animation students should develop visualisa-

tions of initial ideas so that the design aesthetic, the drawings of characters and scenic spaces, would take the lead in the creative process. Rassios explained,

> "I began to conceptualise with the three Animation students. For three months, I drafted story concepts to which they would respond with concept art…One day I mentioned this project to Edith Podesta who immediately asked if she could write the script. However, this would be a process that is seldom encountered in the theatre… Edith would be coming in and responding to the story and the visual concept." (Rassios, 2016)

The *Dracula* project deliberately turned the concept of the sole author for theatre or film, as the writer or director, on its head, and investigated a process which involved many authors, a collective imaginary of creators coming together from many disciplines, with staff and students working together as co-creators, in a similar manner as recommended for teaching creativity in Anderson and Jefferson's publication *Transforming Schools*, "Collaboration has been at the heart of human development, from the meeting of minds in the agoras of Ancient Greece to online communities of contemporary times. The lone genius propelling human development forward is a myth" (Anderson & Jefferson, 2017, p.130).

Rassios and Shaw provided a system for the students based on a series of components, stand-alone scenes or animated installations, which could be experienced in any sequence. Animation students developed design concepts with Rassios, Acting and Fashion Design students devised characters in response to the graphics, while Podesta detailed the spoken-word text, and Music students composed the aural environments. The result was a presentation of a series of installation-like scenes, which combined animations projected onto scenic design elements with which the performers interacted, and performers speaking/singing monologues in character for that scene. The spoken text did not form the usual map for interpretation leading to design and performance.

When the scenes worked well, they pricked at the audience's uncertainty as to what form the piece was taking. For instance, the scene named The Beheaded managed to interweave animation and performance in a beautifully dark piece, in which the animation showed a bird, flying down to peck at the head of a dead woman, who spoke to the audience. Gradually as the head of the young woman told her story,

the scene animated as bloodlines, sprouting from her head to create trees and then a forest of the human body. Rassios changed his idea of this scene once he received Podesta's written text for the monologue, which was an unexpected storyline. So, the creative process was open enough to allow for the writer to impact on the scenes, even although the visuals had already been developed.

While *Dracula* was embedded within the curriculum, each student group had different learning outcomes, based on their discipline. Staff noticed that the sixty students who participated were fully invested, no discipline was involved 'in service' of another; each discipline was equally engaged and valued in the process. The system design for *Dracula* could be described as a closed process because staff put in place structures within which students worked, but with an open outcome, because the presentation was not dictated by any one discipline and was open as to the form it might take. The final presentation sat somewhere between the two main disciplines an animated film and a play. The process had a closed structure based on visualized independent scenes, but was open to the group, not author-led. The writer was not the driving force, mapping out ideas for others to interpret, as would normally occur in theatre or film production, instead the design concepts from Animation students provided component scenarios for others to develop.

On reflection, Rassios felt that as an interdisciplinary process the *Dracula* project was a success, however, if he were to undertake a future project, it would be on a smaller scale with fewer students to be more effective. For Podesta the difficulty in engaging in an interdisciplinary process where the product is open is time: "The more you know your collaborators' work, the more the process can be intuitive and efficient". (Podesta & Rassios, 2017) It made a difference that Podesta and Rassios knew each other's processes well, and that Shaw selected three Animation students who had developed a working relationship already. Overall Rassios and Shaw established a system that worked within the institution pedagogically, and that generated a new process artistically allowing many different disciplines to contribute to the creation of a new work, which importantly found a new form.

2.3 Interrogating Performance Practices, 2016–2017

Interrogating Performance Practices brought LASALLE students and staff together with members of ELISION, one of Australia's leading contempo-

rary music ensembles[1]. The collaboration emphasized interdisciplinary thinking in the creation of new work, drawing on ELISION's experience in structured improvisation and cross-art forms. Tim O'Dwyer, Head of LASALLE's School of Contemporary Music, invited ELISION to undertake a residency over four intensive workshops (of several days duration) in June and December 2016 and January and May 2017, because he was impressed by their capacity to evolve new performance material working across disciplines using improvisation. The project involved about fourteen visual artists, electronica specialists, musicians and dancers. Daryl Buckley, Artistic Director of ELISION, provided the consistent artistic leadership, and O'Dwyer, provided the pedagogical support. While presentations during each intensive were a vehicle to communicate newly created work with others, the long-term aim was not outcome driven towards a 'finished product', but rather the activation of a student practice in interdisciplinary arts. The presentations allowed the opportunity to critique each other, to think through one's own practice and to gain insight through hearing others talk about their work.

Buckley reflected in notes written in 2017 that a key objective of the intensive workshops was to

> "constantly disrupt the familiar, to provoke a change in thinking, and to take students outside of usual applications and practice of their art with the opportunity of reconsidering the norms that bounded their approaches. Students were asked to consider the points of dialogue between each other, as artists, that might be pre-disciplinary and allow for a level of co-creativity, a key question always being how might someone else's practice inform, inflect, change or affirm your own?" (Buckley, 2017)

Buckley described the processes that ELISION applied to the workshop phases as follows:

1 ELISION began performing in Australia in 1986, and has specialized in structured improvisation performance, with a highlight being Bar-do'i-thos-grol (The Tibetan Book of the Dead) composed by Liza Lim with installation artist Domenico de Clario, performed in 1994 and 1995. Their practice explores musical form with cross-art forms and transcultural perspectives. O'Dwyer had worked previously with ELISION, on *Particle Moves*, a sound installation for the Institute of Modern Art in Brisbane in 2003 and *What Remains*, using improvisation as a process to inform performance in 2007.

"Strand 1: Breath of the instrument
Here, we sought to expand the notion of what an 'instrument' might actually be. The provocation was to take a term associated with the practice of music and through improvisation both constrained and inspired by the use of found objects available in various rooms of LASALLE, to construct various structures, 'instruments', that possessed formative qualities.

Strand 2: Reaching outwards from, understanding out of one's own discipline
Here, we looked at various installation practices and choreographer Prudence Lang provided an introduction to William Forsythe's 'Motion Bank' project[2]... We discussed how an idea or a metaphor might be utilized and transferred from one discipline to another, or alternatively provide the framework for a set of radically different artistic propositions. Consideration of spatial geometries and exercises borrowed from dance languages were undertaken with students forming breakout groups, creating work through the use of triggers and durational events such as falling paper and bouncing objects framing and shaping improvisation.

Strand 3: Mapping the performance
Here, the emphasis was placed upon the articulation of a work *temporally*. ...Creating the templates, the processes, by which events might unfold was the priority. Student break-out groups investigated the very notion of what a template or map might be and how it might be used. Choices involved using wall, floor, surfaces of furniture, signage and drawings to shape processes informing shared cross-disciplinary creation.

These investigative strands wove their way throughout all of the intensives undertaken. Some of the final works created included a performance from a LASALLE dance student and Peter Neville (ELISION percussionist). A rather fragile table formed the architec-

2 William Forsythe developed a notation system for dance, resulting in the Motion Bank, a four-year project 2010–2013 in partnership with the Advanced Computing Center for the Arts and Design at Ohio State University, which captured choreography digitally using CG and animation technology, and made it available online as dance scores.

> tural space and membrane that separated both dancer and percussionist but in reality, the performance heavily blurred these nominal role-distinctions – the act of striking, the sonic violence of object upon barely resistant surface, meant that the 'kinetic' enjoined and described both performers, moving them considerably away from what might be their normal modes of performance." (Buckley, 2017)

As outlined by Buckley, ELISION's process was an open one, developing and applying structures to enable a framework for improvisation amongst artists from different disciplines. The outcome was also left open, with a sequence of informal presentations to share discoveries along the way. The workshop intensives were extra-curricular, not embedded within the undergraduate curriculum, and so the students were free to engage in the process without concerns about assessment. This meant that the process was not dictated by set learning outcomes. As an example of system design for arts pedagogy, the ELISION residency was the most open: it had no defined product and was an open creative process, as well as an open learning process. However, the project drew on system approaches, based on agreed geometries, architectural and spatial mappings, and templates for real-time transformations of sounding materials, which developed amongst the participants a bank of modules or components, within which improvisation could happen.

2.4 Investigation 1.0, 2015 to 2017

A recent practice-based research project has led LASALLE Dance lecturer, Susan Yeung, to develop the beginnings of a complex system design for choreographic process from what seems like a simple application of post-it notes in iterative workshops. Her exploration subsequently led to the development of a series of works for local and overseas performances between 2015 and 2017, and she plans to apply this process to her teaching and choreography with her students. The system that she designed is based on deconstructing movement into singular phrases or images so that the ensemble of dancers becomes the collective choreographer, without having to rely on a sole author/choreographer. The process developed from using post-it notes on which the dancers would notate a specific movement or gesture. Yeung developed a colour-coded system so that the individual movement or gesture could be categorised in blocks of move-

ment ideas The dancers would use the post-it notes as a shared language or vocabulary to select and sequence movement ideas, phrases, gestures, with variations based on space and energy to create dance pieces. Yeung's system design is similar to the helix of DNA strands, with the coloured post-it notes carrying the genetic information for the dancers to grow, develop, perform and re-produce a new dance piece.

2.5 Augmented Viewpoints, 2014

The case study that demonstrates the most sophisticated application of system design for arts pedagogy is *Augmented Viewpoints*[3], which was a multidisciplinary performance conducted at LASALLE as part of the Liquid Architecture festival on October 10, 2014. The performance was led by theatre director Adam Marple, an expert practitioner-teacher in the improvisation technique called Viewpoints, with an ensemble consisting of electronic musicians Darren Moore and Brian O'Reilly, visual artists Andreas Schlegel and Dhiya Muhammad and a hand-picked group of LASALLE theatre alumni.

Augmented Viewpoints brought together three arts practices. Marple taught Viewpoints to the actors during their Acting studies and offered open sessions for alumni and students to maintain the practice. Moore and O'Reilly performed for many years as Black Zenith developing sequencing codes for their own style of electronic music, which were shared with Music students. Through LASALLE's MediaLab, Schlegel had been teaching coding to students for years, and applying his coding to create interactive scenic design elements for student productions in theatre and dance since 2012, and had recently teamed up with Dhiya who brought a design aesthetic to the architectural structures. The three arts practices – from acting, music and interactive arts – came together as one larger collective to apply their systems to present *Augmented Viewpoints* in 2014. The academics had developed a community of practice amongst students and alumni resulting in an intuitive understanding of the systems. The three systems overlapped, intersected, to form one new and more complex interactive system to be applied to produce a public performance.

3 The performance was originally titled *Viewpoints*, however to avoid confusion with the 'Viewpoints' as a methodology, the performance has been retitled to *Augmented Viewpoints* in this paper to reflect the application of the Viewpoints to a multimedia setting.

Viewpoints

Viewpoints is a tempo-spatial technique of improvisation that allows a group of performers to function together spontaneously and intuitively. The technique developed from open laboratories at Judson Church Dance Theatre in the 1960s. The artists involved were experimentalists who developed the precepts of postmodern dance and rejected the confines of modern dance practice and theory. One of the key tenets of this group's activities was their belief in a democratic, non-hierarchical approach to creating multi-disciplinary artworks in real time (Bogart, 2004, p. 4). In many ways, *Augmented Viewpoints* aimed to recapture this spirit that gave birth to the development of the Viewpoints methodology. The Viewpoints were first articulated by choreographer Mary Overlie, who broke the elements of performance into six categories of space, shape, time, emotion, movement and story which she called 'The Six Viewpoints'.[4]

Marple reflected on the application of the Viewpoints process to create a product as a live performance:

> "The Viewpoints are explored through Open Sessions, which focus on process, and are not intended as performances to be viewed or interpreted. With roots in dance and theatre training, the Viewpoints development as a methodology centred on the human body. The temporal and spatial elements of the Viewpoints relate the

4 For Overlie, these are the basic elements of performance. When director Anne Bogart was exposed to Overlie's Viewpoints work at the Experimental Theatre Wing at New York University in 1978, she appropriated Overlie's Viewpoints towards an emphasis on theatre-based ensemble work. Bogart observed that the Viewpoints allow a group of actors, often with disparate training and experience, to function together to generate bold, theatrical work efficiently. Bogart, along with Tina Landau, expanded Overlie's six Viewpoints into nine Physical Viewpoints consisting of Viewpoints of Time and Viewpoints of Space. Viewpoints of Time consisted of four components: (1) tempo; how fast or slow, (2) duration; how long or short, (3) kinaesthetic response; the reaction to external stimuli and (4) repetition; the repeating or recycling of an idea. Viewpoints of Space consisted of five components: (1) shape; the positive and negative around us as told by the lines, curves and combinations of those articulated in the body, (2) gesture; expressive representations of ideas, emotions or concepts and behavioural representations of place, health, time and situation, (3) architecture; the influence of the existing space, shapes, colours, light and textures around a performer, (4) spatial relationship; how close or how far to something one is and the story that tells and (5) topography; ones three dimensional placement in a volume and two dimensional placement on a floor.

> actor to their environment. By focusing on 'external' elements outside of the body, *Augmented Viewpoints* investigated the application of the Viewpoints to more ephemeral elements such as sound and light. As a technique that assumed application towards the human body, an application to sound and visuals shifts the focus from a solely corporeal rendering towards a more immersive environment." (Marple, Moore, O'Reilly, & Schlegel, 2016)

Multimedia Environment

The multimedia environment for *Augmented Viewpoints* was composed of an ensemble of nine actors, improvised electronic music generated by modular analogue synthesisers and live interactive visuals which consisted of a projection screen and two large illuminated three-dimensional structures constructed from wooden frames. Moore described the approach to creating the multimedia environment:

> "The visuals interacted with the performers through being affected by the sound in the performance space. The other performers in turn reacted to the visuals creating an interactive feedback loop. There were two modes of visuals that were used; (1) real-time generated projected geometric abstractions and (2) an array of LED light tubes attached to the three-dimensional structures. Both visual elements were distinct in their appearance and form but shared the same input and behavioural parameters that dictated how they reacted to sound. In addition, Schlegel and Dhiya also manipulated set parameters for both visual systems in real-time to create responsive visual relationships." (Marple et al., 2016)

Moore, O'Reilly and Schlegel described their systems and the technical requirements to produce the processes and their effects as follows:

> "The technical setup included two laptops, a projector and an array of sixteen LED tubes attached to the three dimensional wooden structures. The software and hardware for controlling the LED arrays were custom-built within the open source frameworks of Processing and Arduino. The visual system responded to the performance environment through three primary methodologies; observation, computer interface input and sound input. These control elements provided enough variety of methods to interact with the

> underlying programs. The interactive visuals for the projection screen were driven by a custom-built software called Continuum created by Schlegel and Dhiya using code to generate algorithm-based abstract visuals. The visuals were programmed to react to sound received through the computer's internal microphones enabling the influence of the synthesiser output and the sound produced by the actor's movements. Continuum uses six different states, which defined the boundaries of the visual language on the projection surface." (Marple et al., 2016)

The six different visual states produced projected lines, grids and geometric patterns or television static on the screen, influenced by incoming sounds, intensities and frequencies.

Sound

Moore and O'Reilly created the abstract electronic music in *Augmented Viewpoints*, improvising together using their own individual modular synthesiser systems.[5] The functionality of the modules included conventional signal paths of voltage-controlled oscillators, filters and amplifiers as well as unique hybrid and random generating modules. The performative nature of these modules offered the flexibility to make real-time decisions in response to visual stimuli from the interactive visuals and the actors. The method of creating music with this kind of system balances control over the system with the ability to produce unexpected results.

The music interconnected different elements through creating tension between background and foreground sonic events. These intersecting points illustrated the Viewpoints in action. According to Moore and O'Reilly, the aim was

> "to create performative systems within each of the individual modular synthesisers that allowed for micro and macro variations within the sounds themselves. The sonic events contribute to defining the form of the performance. The extrapolation of temporal and

5 Modular refers to the nature of the synthesisers whereby the individual modules are connected to each other via audio cables commonly referred to as 'patch' cables. Modular synthesisers have surged in popularity over the last few years due to the adoption of the euro-rack format, made popular by Doepfer synthesisers, which allows different companies to make modules that share the same power and size specifications.

spatial information from multiple media becomes a syntax for the performers to apply the Viewpoints, creating an inner dialogue and internal logic derived through intuitive means. Within the framework of the collaboration, the Viewpoints methodology complemented the working methods that we had arrived at independently prior to the project. Being part of a multimedia environment increased the number of stimuli and created complex relationships between the sound and other elements." (Marple et al., 2016)

Rehearsals to Performance

The rehearsals allowed the collective to explore the potential of the Viewpoints as a performance methodology and the complexities that arise within a multidisciplinary environment. Marple codified rules for the performers to work with and against. These included highlighting elements that produced interesting results such as spatial relationships, the use of repetition and working with the projection screen. The rules that developed included elements to be avoided such as speaking and having more than seven people in the space at once. The improvisations had no specific narrative. Text, even abstracted, carries embodied meaning and this element worked counter to the goals of the ensemble. Particular attention was also given to developing strategies to end performances. Rehearsals saw time limits applied with visual or sound based cues to denote the end of the improvisation. Marple considered that creating limitations kept the process fresh as it provided boundaries to push against while allowing the freedom of improvisation within those boundaries; an approach akin to John Cage's aleatoric compositions whereby the performer improvises within a given structure.

By applying the Viewpoints to different media, processes and practices within a performance setting the Viewpoints methodology adapted to become an efficacious interdisciplinary framework supporting new improvisatory structures and paradigms for multimedia performance. By engaging each element individually, Viewpoints provided a rigorous yet open-ended structure to aid collective improvisations. The interdisciplinary process was efficient due to the prior working relationships of the participants, and their development of collaborative systems within which they were able to create artistic outputs. All three systems, the Viewpoints, the Sound, and the Multimedia Environment, were open, improvisatory, working within modular structures, aimed to come together.

3. Conclusion

The five case studies demonstrate an interest in arts education to find pedagogic processes, which allow for students and staff, alumni and professional practitioners to engage in collective, collaborative co-creation, where there is not a sole author or artist, but many artists contributing to an outcome. This paper has argued that some system designs can be defined as open and others as closed. *The Revolutionary Model Play 2.0* involved many artists in an iterative research process, but it remained closed in the sense that each artist's contribution was limited to their discipline, and the overall final decision-making was that of the theatre director, and the outcome was closed as a theatrical presentation. In contrast, *Interrogating Performance Practices* was an iterative, open process with several open presentation outcomes demonstrating interdisciplinary art of different forms. *Dracula* was an iterative, but closed process involving many artistic contributions each bringing their discipline to the process, while the outcome was always open, never defined or limited, searching for the possibility of creating a new interdisciplinary art form. *Augmented Viewpoints* represented open, iterative processes, which were combined and applied to a closed presentation, a live performance. Yeung's *Investigation 1.0* pursued an open and collaborative process, resulting in several presentations.

Features of the system designs that were most suitable to sustaining interdisciplinary arts pedagogy included processes that allowed for iterative interaction over a period of time, enabling the artists to develop an intuitive understanding of each others' work, vocabulary and approach; and processes that enabled modularity, with segments of creative process which could be broken into modules and applied in any sequence; and improvisational rules which allowed for a number of artists to provide input simultaneously to form new patterns for a creative environment or piece. The iterative, modular and improvisational system designs, if applied from several different arts disciplines and by many different artists, ensure that the arts practices and outcomes are always new and innovative. It is together that we'll 'get there', through creative learning processes, which generate many 'there's', many endpoints, many innovative design solutions and distillations of aesthetic experiences.

This paper proposes system designs for arts pedagogy based on the potentialities of collective collaboration rather than the individual artist and on the multiplicity of outcomes made possible by focusing on process rather than product or object. The proposed system designs for arts

pedagogy offer variations based on how open or closed the process and outcome might be. It is possible to develop a system that is entirely open for both the process and the outcome, or to work with a system that has an open process and closed outcome, or closed process and open outcome. The system design provides an initial conceptual framework for the engagement of students with collaborative and interdisciplinary pedagogical arts practices intended to serve as the basis for further investigation, which is required to evaluate how widespread interest in system designs is amongst arts educators globally.

Amanda Morris
Dean, Faculty of Performing Arts,
LASALLE College of the Arts, Singapore
amanda.morris@lasalle.edu.sg

Wolfgang Muench
Dean, Learning Teaching & Research,
LASALLE College of the Arts, Singapore
wolfgang.muench@lasalle.edu.sg

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Self-Supporting Textile Future

How to shape a sharp professional textile designer's profile

Isabel Rosa Müggler Zumstein, Brigitt Egloff

Abstract

This paper aims at defining the importance of material knowledge as practice of designing and building a professional textile design profile.

The authors are teaching in MA programs and have observed the ability to transform apprehension about a self-supporting future into strong belief of individual and collective skills in order to start a career facing a designer's reality. The paper unrolls the story of four students developing their professional profile, coming from their BA studies where either collective or individual skills have been in the foreground. Each one has individually found a way of addressing their textile skills to different design contexts validating the importance of material knowledge.

By nature, textile projects are interdisciplinary because a designer's investigation always triggers other disciplines contribution when it comes from concept to completion in production. Therefore, an important skill is to discuss a designer's point of view with production people, chemists, engineers, scientists, etc. Every featured example reveals how the personal goals could only be achieved by interacting in teams within an interdisciplinary context, with a strong artistic approach and advanced material knowledge.

While textile design is often under suspicion of pure aestheticization all examples described here, however, are giving proof of complex settings:

Integrated storytelling in pattern stimulates the product-user interaction.

A second example transfers authorship and the disciplinary one-dimensionality and attempts to meet design in an art context resulting in a social business network for production of handcrafted carpets empowering women in Morocco.

A third one proves textile design can be more than a problem-solving attempt, pushing limits of industrial weaving and gaining atmospheric qualities for applications in architecture.

A fourth one is exemplary showing how co-creation in textile design can lead to business models.

The authors conclude from a contemporary designer's point of view how textile can creatively, strategically and in the event gainfully be adopted for a fulfilling business practice, extending the ex-

isting textile variety and material culture both by working interdisciplinary in teams or collectives and as an author or artist.

Theme: Alone
Keywords: textiles in MA program, self-supporting textile future, authorship vs collectivist, unique selling point for textile design, how to sharpen the professional textile designer's profile

1. Introduction

> "Textiles are literally and figuratively woven into human history and culture. Today communities of makers, designers, and scholars are exploring textiles – from locally crafted materials to 3D knitted matter to hand-embellished fabrics – and pioneering textile-based industries and theory".

This quotation from the MFA Textiles founder Lidewij Edelkoort can be seen on the website of Hybrid Design Studies at Parsons New York. The Master of Fine Arts in Textiles, launched in 2018, aims at preparing students for various sectors in the emerging creative industry, tracking the limits between craft and technology, keeping up with contemporary practice in environmental sustainability to social justice and connecting the field of textiles with fashion design, product design, interior design, textiles research, fine arts, architecture, and many other hybrid fields. (cf. https://www.newschool.edu/parsons/mfa-textiles/)

Textile design is therefore interdisciplinary by nature. Depending on the markets, several different activities are involved in fabric design. The number and type of any designer will vary according to the raw material, production methods and technologies used, or the type of company, stakeholder, costumer for which the work is done. The role of the designer can therefore be quite complex as the quotation above proves well.

Elaine Igoe proclaims textile design as a sub-discipline of design, with specific methodologies and unique ways of thinking (Igoe, 2010). Choosing archetypes to characterize textiles, she further states that textiles carry significant meaning and are innately highly relational, meaning that a designer's investigation always triggers other disciplines contribution when it comes from concept to completion in production.

The purpose of this article is to present four different textile design positions in master class education, investigating their motives and how they apply their specific material knowledge originating from textiles. Why did these students choose to invest into master studies? The global textile industry is in continuous transformation due to globalization, sustainability issues, social and technological progress. This causes changes within the discipline of textile design itself. The growth of innovative textile design work is obvious, since textile designer are applying their knowledge on photovoltaic panels, for LED embroidery, for developing banana fiber and many other applications. (cf. https://www.hslu.ch/de-ch/design-kunst/forschung/produkt-und-textil/#?filters=1132)

Hazel Clark describes in her text "New Approaches to Textile Design" and in her conclusion about collaborations between designers and scientists that, as life becomes more complex in the twenty-first-century, all types of design practices must respond and that trans-disciplinary and collective approaches can lead to the re-evaluation of tradition, while integrating the use of technology. (Jefferies et al, 2016, p.24).

These textile and non-textile strategies as well clearly show that on the one hand textile design can make a substantial contribution to the future and on the other hand give rise to questions on what role professional textile designers may play.

2. Observation Setting in Education

In fact, the textile design discipline appears to attract a broad variety of students. Therefore, it presents the design scenario, which offers a multitude of different collective production models, open source approaches, digital networks and peer production which has increased the complexity of the design process and has influenced the educational approach as well. (Bauwens, Gershenfeld 2007).

Students approaching our institution often are in the process of gaining a personal view on contemporary challenges in the field of textile design: these are for example the distinction and positioning of their interests between art & design, the fruitful contrast of aesthetics & function, paradox of fast fashion versus long-lasting quality, choice between co-creation & authorship. The studies allow them to rethink where they come from and where they professionally want to go to asking the uncomfortable questions about the risks popping up while they develop themselves professionally. The students' apprehension about a self-sup-

porting future lead to the need to sharpen the individual design profile referring with textile skills to a professional context. Last but not least their successful practice is deeply rooted in material knowledge. Every featured student's example in this paper reveals how the personal goals could only be achieved by interacting in teams within an interdisciplinary context and by a strong belief of individual skills in order to start a career facing a designer's reality. Stand-alone positions proved to be as useful as collaborative design, co-design, and any other interdisciplinary work process. The debate about interdisciplinary processes versus individual authorship are not easy to be discussed in the field of textile design as the described examples will prove.

The selection criteria for the four featured cases are the following: they illustrate how widely textile knowledge can be applied from every day to very specific characteristics and in many ways of collaboration starting from a strong design idea or artistic approach. Achieving an application of this design idea, the authors make use in all four cases of different kinds of collaborations in specific networks where they as designers take on individual roles and are interacting with several stakeholders and peers. In that sense coming from a Bachelor level, they have all gained more responsibility targeting a wider range of audience with their creative work.

The two authors have been co-teaching for ten years. Their observations and conclusions are rooted in their experience in education (Bachelor and Master) and textile research as well as in a professional activity as designers.

2.1 Gloria Kinzelmann

Title of project: "uncover" – designing bed linen (Original German Title: Auf Decken – Gestaltung von Bett-Textilien)

Gloria Kinzelmann has achieved a Bachelor diploma in textile design in Reutlingen. Right after that she initiated her work as a free-lance designer selling her textile designs to different companies such as the Swiss company Fabric Frontline. Gloria has extraordinary drawing talents, the designs are mostly naturalistic and result from a time-consuming process. Her creative skills became her signature, her drawings beautifully express her detailed observation of nature and objects, which she translates into her textile designs. Although her style was popular with many customers,



Figure 1. Textile Design addressing a long-lasting product range such as bedding: the design adopts elements from art history transforming them into a contemporary product. Picture credit: HSLU – Lucerne University of Applied Sciences & Arts

she was facing the problem that her designs are too expensive and that she can't cover her invested efforts by her earnings. This uncomfortable situation forced her to rethink her way of working.

Furthermore, she started questioning her role as a textile designer feeding the fast fashion cycle with pattern content of only short value. How can textile patterns become more meaningful and last longer than a fashion's season? The paradox of fast fashion versus slowly and thoroughly developed textile design could be solved with conceptual selection of image content in order to create a narrative impact through textile design. In addition, during her studies, Gloria has acquired skills in jacquard technique (Kaeser, 1894) to cover not only drawing capabilities but also the knowledge of the production process in weaving.

She finally chose the long-term application for textile designs such as bedding to create long-lasting value for her creative work. Her patterns adopt classical textile themes such as animal prints, play with trompe-l'oeil effects and invite the customer to discover subtle and still image information. Microstructures such as tonal weaves are building the textile surface of the white bed linen. With prints she designed multi-layered pattern elements with symbolic impact which she carefully integrated



Figure 2. Jacquard woven textile design: the pattern adopts traditional animal pattern elements converted in a non-colour textile; pattern details are visible as various rough and fine structures revealed and assembled to an overall image in different light settings. Picture credit: Gloria Kinzelmann

into the repeats. Timeless patterns may reveal its sometimes well-hidden content only on the second view.

It is her intent to deepen her material knowledge of weaving along with the willingness to map the capabilities of a textile designer directly with a product range which helped her to sharpen her professional profile. Looking back at the emergence of jacquard weaving in the 19th century, it was a requirement at that time already, that a designer not only drew the motive, but also understood the subsequent steps in processing production design (Kaeser, 1894).

Gloria is now holding a professional design position in the industry being responsible not only for the creative part but also for the implementation of the design in production in various technologies. In this case textile design is not a component product in the design process itself, it rather shows that profound skills in textile design do create a unique selling point in one's professional profile

http://www.schlossberg.ch/

2.2 Salomé Baumlin

Title of Project: knotted life environment – Zen inspiration (Original German Title: Geknüpfte Lebenswelten – Inspiration Zen)

During her master class studies the artist and designer Salomé Bäumlin started to combine textile as media with her artistic work. Her specific approach to design is the modification of the traditional design language of the Berber tribe from the high Atlas in Morocco mixed with urban signs of western cultures. The result are hand woven carpets, every piece unique through her modification. Craftswomen implement the designs on behalf of the artist and enhance them with their own interpretation. The combination of one's own artistic conception processed into hand crafted products, creates a basis for the exchange between cultures. Salomé Bäumlin thus shows through her work a novel possibility of encountering cultures on the basis of joint design, still using her strong authorship in the design process. By allowing the common interpretation of the design work into traditional handcraft, openness from both sides, artist and craftspeople, is essential.



Figure 3. Vertical set-up of a weaving loom for the production of hand-woven carpets in Marokko. Picture credit: Salome Bäumlin, 2014



Figure 4. Final product of a carpet consisting of manipulated traditional design elements. the overall expression follows the designer's vision but includes influences of the weavers complementing the final design hands-on while producing it. Picture credit: Salomé Bäumlin, 2014

The process of this collaboration has been inspired by Zen characteristics: asymmetry, simplicity, dignity of aging, naturalness, profundity and ease of mind, combined in plain design, untreated wool and the technical possibilities of the hand-crafted carpet production in Morocco. The artist has established an innovative and interactive partnership with the artisans based on their skills. She is involving individuals throughout the supply chain and supporting the craftswomen with an independent income. The appreciation for the slowness and the sustainable side of skills, craft and artistry fits well with the characteristics of Zen. By engaging with local communities, the artist puts the focus on her efforts in autonomous local handicraft that leads to culturally influenced products and design.

Working as a "social entrepreneur" at the intersection of art and design, provides in this case a living as artist addressing the design context.

This example proves well that textiles works as a component product from an entrepreneur's point of view, providing jobs for artisans and gaining a living for the artist. Although the carpets are done with yarn, a typical textile materiality, the design process was divided in two. The contextual input coming from the designer, the interpretation of the design implemented by the craftswomen. The textile design made into a

carpet is therefore the result of an interactive and collaborative process curated by the artist.

http://aitselma.com/kollektion/edition-salome-baeumlin/

2.3 Marie Schuhmann

Title of Project: Soft Space for Textiles in Architecture

Marie Schuhmann has achieved a Bachelor diploma in textile design in Hamburg. As a result, she could develop strong confidence in her drawings as a source of inspiration and a creative starting point for material explorations and textile design. Unfortunately, she hardly got in touch with industrial production, which was the reason why she decided to study in a Master program to expand her knowledge in the field of industrial jacquard weaving and defined her master project accordingly. Her aim was to develop woven structures, that can be applied in interior spaces, adding a tactile quality to other existing architectural and mostly flat surfaces in a room. With that aim, she approached production technology in a creative way by challenging technological boundaries. As weaving is a systematic process, she tried to bypass it by creating technical data exploring the precision of the machine in an opposite way.



Figure 5. Detail of jacquard woven structure with floating threads creating a blurred colour impression. Picture credit: Marie Schumann, 2017



Figure 6. Display of Soft Space Textiles in the final show giving an idea about dimension and expression of the sculptural textile materials in a spacious context. Picture credit: Marie Schumann, 2017

How long can threads fly and float over the width of the fabric? What materials are most suitable to create such loose elements within a strongly woven structure? Her process included close interaction with the technical preparation of data for the weaving process. From a design point of view, she tried to reach maximum effects through manipulation of technical data in a way that is normally avoided. She only achieved her vision of a soft textile space based in architecture by overcoming standard technical settings while constructing a durable woven material for interior application. As a result, her textiles show colour effects created by threads of different colours being part of a strong woven structure, but floating over this surface and hanging loose. These floating threads are blurring precise outlines and pattern information creating a tactile sculptural expression.

Marie's soft textiles can be described as atmospheric interventions in living spaces, allowing the observer to lose himself in these blurred surfaces while looking at them. Marie herself is the author of the soft textiles, every piece is showcasing an image idea which through the application of material knowledge in industrial production becomes accessible to others. Coming back to the idea that textile design is interdisciplinary by nature, in this case the designer was strongly dependent on the collaboration with the TextilLab in Tilburg, Netherland. (cf. http://www.

textielmuseum.nl/en/page/textiellab). There the technical expertise of the TextielLab which supported the design ideas to be translated into fabric on state-of-the-art machinery to ensure a distinctive end product. The unusual approach to industrial weaving is caught in a machine-made imperfection creating sculptural textiles with no repetition.

Today Marie is working in design research responsible for the contemporary exploration of silk archives (cf. https://www.silkmemory.ch/). She is filing new content such as silk jacquards and describes its technical specifications. At the same time, she promotes the use of the open-access digital archive in the design community.

http://www.marieschumann.de/

2.4. Emanuela Zambon & Cornelia Stahl

Title of Project: timeless, unisex – from market position to the Viscosistadt collection

After their Bachelor studies in Lucerne Switzerland, the aim of Cornelia Stahl and Emanuela Zambon was to start their own design studio offering design services to companies and, at the same time, to launch a textile product line which they design, produce and promote under the label of ZAMBONSTAHL. In their jointly developed textile master collection of ZAMBONSTAHL, the created patterns and the chosen materiality do com-



Figure 7. Uni-Sex Print design: the product shows a digital print on jersey material made into a men's shirt, the textile design can as well be applied in women's garment. Picture credit: Zambonstahl, 2017

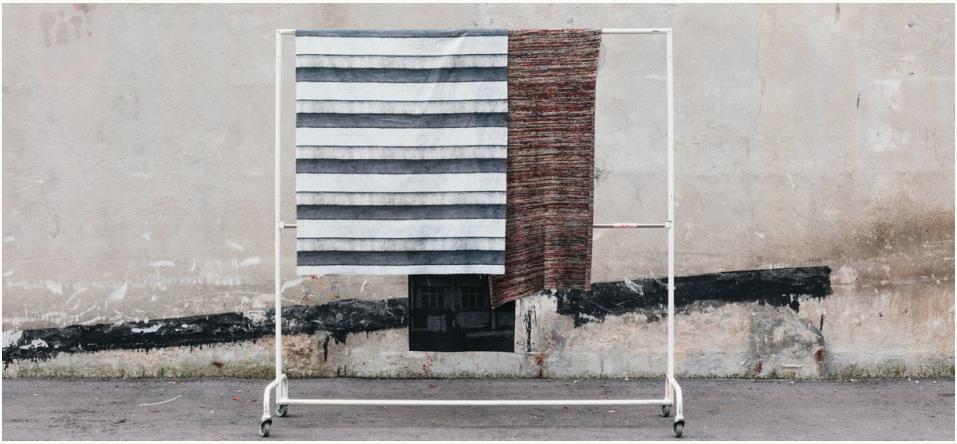


Figure 8. Textile designs by the collection Zambonstahl: they consist of photographic material which the two designers themselves generated in an industrial environment, the final designs again are featured in an industrial setting, the textile designs reflect the origin of the visual material. Picture credit: Zambonstahl, 2017

municate meaning through their content and through the targeted application. The two designers have been combining their talents and styles in playful easiness and achieved a design process to create elaborate timeless designs for the applications in fashion. The duo is fostering a plain design vocabulary used in an all year round collection for both men and women aiming at long-lasting and unisex products. For their master collection, the two textile designers have been specifically inspired by the industrial aesthetics of the university's close surrounding. Brick walls, metal handrails and industrial facades have been integrated into textures, colours and patterns, showing the textile past of that area. But the main purpose of the textile collection was to exemplarily show and reflect their design process as a team.

From the early stage, the two designers have been working with shared design ideas, sketches, materials e.g. criteria's, such as "unisex and timelessness" and specific design methods like using the morphological chart to develop designs, backed by their work process. This lead to the evaluation of appealing results on various market situations.

The students intelligently used their master studies to exemplarily go through methods of joint design processes, analyzing their design languages and melt them into "one", working with stakeholders and focusing on competitor analysis, while at the same time setting up their own business model. During the Master studies, classes have been used help-

ing to design a website, a financial scheme, an analysis of the working process, investigating the legal status and textile skills. All this rounded up the knowledge of material in order to identify strengths and weaknesses of their collaborative work.

The two designers have thoroughly reflected on the textile design process and they have gained insights how they can activate the creative potential while designing interactively. Only when the context of the application is identified the textile design will be finalized in terms of dimension, material and technique. The relevant criteria in this phase are given by their customers and partner companies which transfer the design ideas into products like bed linen, garments, back bags and accessories.

Up to now, the focus of the Designer Duo lies on designing industrially manufactured products and achieving financial independence.

zambonstahl.ch

3 Comparison: Common Grounds & Distinctions

In returning to the title of this paper it is important to stress that textile design is a sub-discipline of design, as Elane Igoe states, a half-product, often not exactly defining its final purpose.

The role of the textile designer is changing and also the skills acquired from the training courses must change at the same time, too. The new generation of designers needs abilities to manage all phases of the design process from its initial stage – generating ideas – to its management and verity of the product's industrial feasibility on one hand, and the needs to share multidisciplinary experience on the other hand (Sanders, Stappers 2008). But textile design has always been interdisciplinary, that's yesterday's news. Nowadays, textiles move beyond the creation of products and services and, instead, contributes to knowledge exchange and concept development, as Louise Valentine states. (Valentine, 2017)

If we discuss textile design education on master level, then we argue that it is not about re-inventing textiles, but defining an appropriate design strategy along with a personal attitude based on personal skills and the decision on what stage interdisciplinary action takes place. Is it on design level, when visual, material and intellectual engagement takes place like in the example of Zambon/Stahl and Salomé Bäumlin, or does it take place during the production process, where technical knowledge and infrastructure are a key value like in Marie Schumann's and Gloria Kinzelmann's case?

What the four stories all have in common is the fact that all these students began their Master studies struggling with many open questions about how to successfully enter into a professional life. After completion of their Master studies, some questions could be clarified and new experiences and insights were showing them an individual direction to take. Self-determined, they gained confidence in a professional future. Seen from a Master curriculum point of view (Eckert, 2017), the four examples illustrate the first stage as they now practice the designer's role of makers, researchers, entrepreneurs and therefore are responsible for the creation and distribution of artefacts being aware their relevance. During the Master studies, they have managed to expand the field in which they apply their knowledge of materials from a limited creative responsibility in making a textile design into a wider context, gaining more responsibility for the impact of what they do (Eckert, 2017).

Besides they all took the chance of developing a specific strategy originating from their textile skills and the knowledge of materials. Furthermore, they worked hard understanding, that finally the environmental setting is defining the value of the textile design, and that therefore, they have to be very careful about the context to which they address their skills. Unless the context and use of a textile design is given, its relevance remains undefined.

4. Conlusion

We conclude that material knowledge originating from textile skills is compulsory if it is throughout Master studies paired and amplified with one or more of the following competences. This allows to round up a Bachelors textile design diploma in order to create a sharp designer's role addressing material knowledge to the context of theory and practice, production and application. In that sense material knowledge rooted in disciplinary skills is expanded to connecting competences (Eckert, 2017):

- Textile design and the meaning of its pattern content: the theory of product language not only specifies objective characteristics of products but describes symbolic aspects as well. Asking questions about the meaning of visual content in patterns therefore can lead to new interpretations of textile heritage. In a design process and from a conceptual point of view such reflections do add a new dimension to what a textile design does represent and what its symbolic impact can be.

- Textile design and entrepreneurship: extending the role of a designer into embedding material knowledge in different markets and fields. Letting others create allows to face new design challenges apart from making but defining and managing how this is being done. This implies the focus on social and sustainable aspects of the creation process including the interaction with all individuals and stakeholders being involved in that.
- Textile design paired with free exploration: taking the risk of breaking existing rules and standards within the discipline in order to expand the existing variety through an experimental approach. It is the thinking outside of the box which creates fresh ideas and solutions. This kind of approach interferes with parameters in the process. Therefore, the final design is an outcome of the creative manipulation of the process, but has not as such been designed in detail.
- Textile design and manufacturing technology: deepening disciplinary skills can allow a designer to take on wider responsibilities in the making process. Being aware of the technology means to be able to directly interact with production in order to influence the decision-making process while producing a design. This allows designers to hold a product management position.
- Textile design and connective competences: as textile design is by nature interdisciplinary it is obvious to consider material knowledge as source and starting point to achieve connecting competences which are the key to complex, future oriented and relevant design activities which results in interacting with other stakeholders and peers in- and outside the design community.

The dynamic exchange that is taking place between various design disciplines is creating a new range of possibilities that takes textile designers into exciting new directions. What Sanders and Stappers in their paper "Co-Creation and the new landscape of Design" state concerns textile design in particular:

> "Designers provide expert material knowledge that another stakeholder doesn't have. Designers' professionality keep track of existing, new and emerging technologies, have an overview of production processes and business contexts. This knowledge will still be relevant throughout the design development process."

The discussed examples illustrate that strong aesthetic and individual skills provide a unique perspective and in the same function as a new voice for sovereignty. Beyond doubt, collaboration and interdisciplinary action open new fields, but in terms of design education we must be aware that we focus on individual skills and on areas which will be even more important in the textile future namely creative authenticity. The authors are convinced that this is the backbone of a contemporary design career and will create a fruitful added value in life.

Isabel Rosa Müggler Zumstein
Researcher Product & Textiles,
Lecturer Master Design Lucerne
University of Applied Sciences & Arts, Switzerland
isabelrosa.mueggler@hslu.ch

Brigitt Egloff
Lecturer Master Design and
BA Textile Design, Researcher Lucerne
University of Applied Sciences & Arts, Switzerland
brigitt.egloff@hslu.ch

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Audience As The New Creative

A Study of the Co-creation Role Audience Play in a Participatory Environment to Create Effective Advertising Campaigns with the Creative in the Context of Singapore

Kathryn Shannon Sim

Abstract

As digital technology has profoundly changed the way people communicate and interact with each other, there is a need to also change the way in which advertising communicates with its audience. Thus, a good advertising campaign should be one that leverages on digital communication and co-creation to enable active engagement, participation and reaction from the Audience. It is about creating a participatory environment for the target audience to co-create successful advertising with the Creative in order to increase its effectiveness. Besides examining past successful Consumer-Generated Advertising (CGA) campaigns to study the interaction and engagement of the Audience which had made them effective and led to their success, a series of interviews with key creative professionals in Singapore were conducted to provide insights into the co-creator role the Audience play in a participatory environment to create successful participatory advertising campaigns with the Creative in the context of Singapore. All in all, the findings gathered affirmed that the shift in the way people communicate due to the digital revolution has called for a collective effort between the Creative and the Audience to produce effective advertising campaigns that can break through ad clutter. This study would benefit agencies, brand owners, brand strategists, marketers and communications professionals by offering them a better understanding of the shift in the changing advertising practices today, and in return create a more vibrant and creative advertising industry.

Theme: Alone
Keywords: participatory, digital, co-creation, interactivity, advertising, collectivity, technology, social media

1. Introduction

Traditional methods of advertising were more effective in the past because audiences were isolated, passive and unaware as technology was not as advanced. Although they may have had plenty to say about the advertisements they saw, they chose to remain quiet because voicing their opinions to a large audience was difficult and time-consuming (Blackshaw, 2008). The 21st century has witnessed more changes in the

history of communication than ever before. First there was the Internet, followed by the mobile and, today, almost everyone has a social media account. The connected generation prefers to communicate online and they spend a large part of their time participating actively in online activities such as writing on a friend's wall or posting pictures. They are no longer passive observers of things, but individuals who demand a shared experience (Jack Rotfeld, 2006). In addition, the digital technology age has enabled new channels for communication, collaboration, and circulation of ideas. It has also given rise to new opportunities for consumers to create their own contents, where the dynamics of groups of people can be seen on social networks such as Twitter, Facebook and Youtube. However, what provides the drive for these platforms is not just the outlet for expression, but participation in a mass collaborative audience environment that allows strong support for creating and sharing each other's contents. All these, in a way, form what this research would term a Participatory Culture (Jenkins2009).

This paper discussed the above-mentioned changes and how they present threats on the traditional forms of advertising, namely, print advertisements, television and radio commercials. It explains how it is important to have the Audience and the Creator of the campaign reciprocally linked, which builds the basic premise of co-creation in order to create effective advertising in today's digital technology age. This paper advocates participatory advertising, which mirrors the transactional model of communication also known as the circular model of communication by Barnlund (1968), to address ineffective advertising today.

The findings from the literature review are mainly based on the perspectives of the western countries, which have very different cultures and interests in comparison to Singapore. Therefore, in order to establish the importance of employing co-creation as an effective solution to creating effective adverting in Singapore, the aim of this study is:

1. To examine the co-creator role that the Audience play in a participatory environment when creating participatory advertising with the Creative in Singapore.
2. To examine if co-creation is an effective advertising method to use in digitally savvy and connected Singapore.

Literature review surrounding the topic of participatory advertising was conducted. This included examining past successful consumer-generated

advertising (CGA) campaigns to study the degree of interaction and involvement from the Audience leading to their effectiveness and success. In addition, a qualitative study through a series of interviews with key creative professionals based in Singapore was conducted to discuss their views of Audience as the co-creator when creating participatory advertising in Singapore. As technological innovation will continue to redefine the Singapore advertising landscape, the findings from this study will shed light on the future of advertising in Singapore and enable the creative professionals to produce effective participatory advertising campaigns to truly resonate with audiences.

2. The role of the Internet in changing the way people communicate and the advertising industry as a whole

The invention of the Internet and the rise of a digital revolution resulted in a shift in the role of the consumer. Consumer behaviour has changed as they are now exposed to a multitude of information from all across the globe, making them more informed, active and connected (Prahalad & Ramaswamy, 2004). This massive rise in accessible information allows the customers more flexibility in terms of choosing products and comparing them with competitors (Winsor, 2004). Moreover, the Internet and social media, such as Facebook, Twitter and Instagram have given audiences the freedom of expressing their unsolicited opinions and feedback in the most trouble-free way. Today, their collective voices have given them more power and influence over the companies (Blackshaw, 2008). Consumers are no longer passive observers in the marketplace of ideas and commerce. In fact, they are defining and shaping the business landscape and the marketplaces of tomorrow (Blackshaw, 2008). With these changes in consumer behaviour, it is no surprise that there is a growing distrust of advertising and marketing. Ariely (2008) mentioned that messages from commercial sources have less credibility than those from a rating service. This is because consumers now realise that advertisements by companies might not be authentic, whereas honest feedback from consumers provide an unbiased assessment on the product's value. As such, traditional advertising media today are now facing a drop in expenditures. This downward trend will continue across other media such as newspapers, radio, magazines and TV. Traditional advertising methods are, thus, losing their effectiveness in comparison to the past.

2.1 The shift from consumer to prosumer

The model of communication by Shannon and Weaver (1900) has reigned over advertising for the past 50 years but is declining with the advancement of technology because consumers are no longer passive receivers of advertising messages.

The term prosumer was coined by Alvi Toffler in the 1980s as a name for consumers who play an integral part in co-producing the product of experience (Ritzer, 2009). He also mentioned that production and consumption combined, prosumption has been trending in most sectors of major markets. It is also increasingly trending in the entertainment industry, such as radio and television programmes where possible performers can come from members of the audience who are also consumers. Rust & Oliver (1994) added that it is now a new era of producer and consumer interaction. It is a time characterised by the industry as a participatory age, exemplified by what the media called the emergence of the creative and do-it-yourself consumers. It is, therefore, safe to say that the consumers of today are no longer passive and want to be in charge, and that's what participatory advertising was designed for (Montague, 2001). As technology shifts the power away from the producers of the products to the consumers, participation in advertising is increasingly relevant to achieve effective advertising. One of the merits of participatory advertising is that it can be very entertaining or compelling, so much that people want it in their lives.

A case study would be the Old Spice Response campaign. The campaign interacted with audiences by asking them to send in questions via social media and, subsequently, aired entirely on their Youtube channel. To date, it has garnered a total of 7.6 million views (Re: Everyone Old Spice, 2010)

It received 5.9 million views in the first 24 hours, which was higher than Obama's victory speech. The Old Spice Youtube channel became the number one most viewed channel of all time. More importantly, their sales increased 107% and their advertised men's body wash became the number one selling brand (Dandad, 2010). The Old Spice Response campaign is a very good example of a successful CGA campaign co-created bythe Creative and the Audience. It proves how great storytelling coupled with active audience response in a participatory environment can help drive traffic and awareness for the advertised brand and product, thus leading to memorable and effective advertising.

Improvement in technology accelerates consumers' inherent desires to create content and also get involved. As shown earlier in the Old Spice

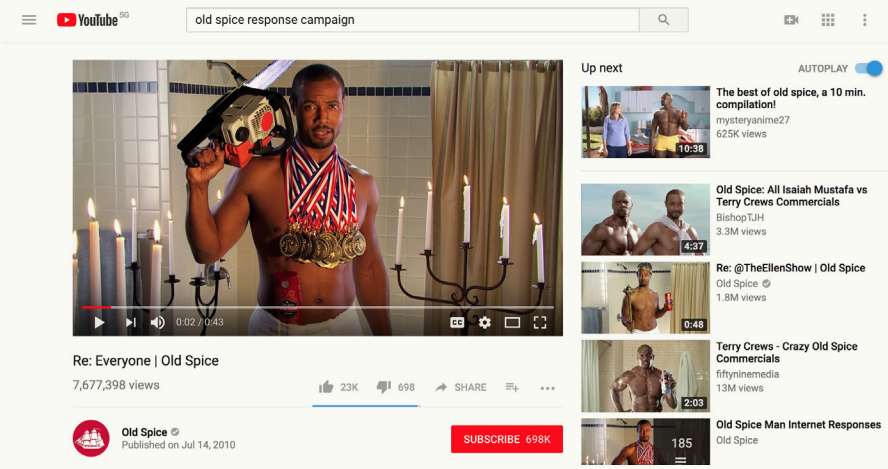


Figure 1. Re: Everyone Old Spice, 2010



Figure 2. Old Spice Twitter Responses – The Inspiration Room (Macleod, 2018)

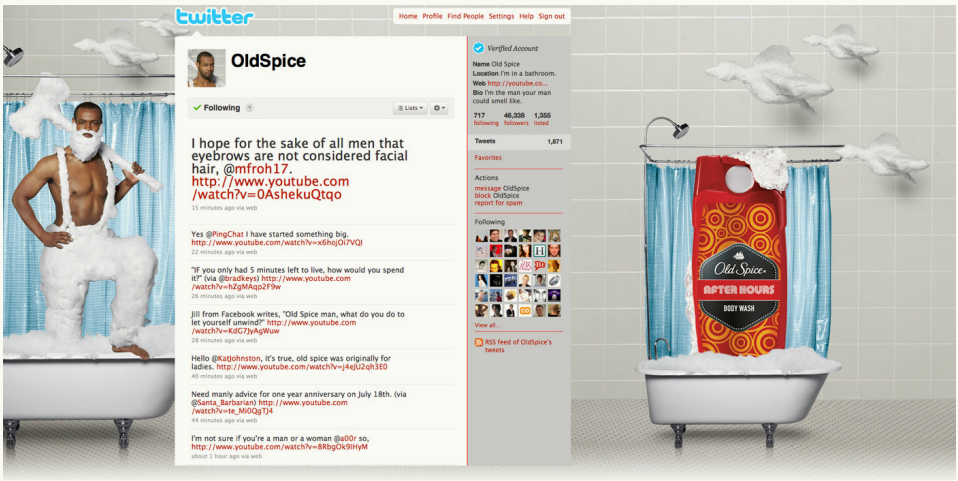


Figure 3. Old Spice Twitter Responses – The Inspiration Room (Macleod, 2018)



Figure 4. How Tesco virtually created a new market on a country's lifestyle (Businesstoday.in, 2018)



Figure 5. TESCO Homeplus: Adding Creativity to the Discount Retail Store Business (Kim, 2018)

Response campaign with the convenience of technology, utilising social media would speed up engagement with the brand. Another case study, which had used technology to encourage participation would be the Tesco Homeplus Subway Virtual Store launched in Seoul, South Korea.

To reach out to more customers, the campaign used technology to bring the store to the people. The experience was the same as shopping in a supermarket but, instead, shoppers used their smart phones to purchase. Blending QR code and the smart phone application, the campaign gave consumers no reason not to shop at the store due to sheer convenience and entertainment factor. As a result, Homeplus increased sales and the number of registered members rose drastically. The brand also became the number one online market. This shows that technology, with higher standards of living, provides a largely positive platform for increased participation in advertising. As such, the intrinsic motivations of the consumer and the environment play important parts as previously identified. These factors would in return help agencies strategise effective advertising campaigns to capture interest and ensure active participation.

3. Participatory advertising and co-creation

As mentioned previously, the invention of the Internet and the rise of the digital era have profoundly transformed the advertising industry. Global connectivity, social networking, new methods of communicating and exchanging information have fuelled the revolution in the value-creation system between the companies and consumers (Ramaswamy & Gouillart,

2010). The change in the nature of the consumers themselves, contributes greatly to this revolution. Consumers demand more quality interactions and deeper value-creation from businesses (Ramaswamy & Gouillart, 2010). They have changed from being passive observers to individuals who seek to 'exercise their influence in every part of business systems in a two-way communication process (Prahalad & Ramaswamy, 2004). The traditional advertising methods are constantly challenged as consumers turn to a new way of communication, which seeks more of an experience in a two-way conversation rather than a one-way bombardment. In order for advertising designers to produce effective advertisements, it is crucial for them to understand this very nature of today's consumers. The longer companies hold on to their old advertising methods, the more they will drive away their consumers (Blackshaw, 2008).

Due to the nature of co-creation that requires an instant response from the audience, co-creation will be best if applied in consumer-generated advertising campaigns (CGA). CGA includes social media such as Facebook, Twitter and YouTube, mobile advertisements, and any other platforms that allow consumers to generate content. CGA's online and fluid nature allows the audience to express their preferences by providing platforms for sharing of opinions in a flexible and interactive way (Blackshaw, 2008). However, despite the seemingly attractive benefits we can get from online media, there are challenges faced as well. The Internet's chaotic and free character presents challenges to CGA campaigns, in areas over which the company has no control (Blackshaw, 2008).

Nevertheless, the new model of advertising should be one that encourages organic company-consumer collaborations by allowing the Audience to not only receive the message, but also be directly involved inthe evolvement of the campaign. This process involves four building blocks of co-creation in the DART model of value co-creation: dialogue, access, risk assessment, and transparency (Prahalad & Ramaswamy, 2004). Dialogue means interactivity between company and consumers which goes beyond listening to a shared learning. Access is providing consumers with information and tools, which are related to the brand. Risk assessment is educating consumers about the probability of harm associated with products and services. Transparency means ensuring the clarity of company's intentions in regards to its advertising moves. This DART model forms the ideal values of co-creation.

Apart from responding to the change in consumers' communication patterns, the use of co-creation will result in these benefits. Firstly,

co-creation develops brand loyalty and brand awareness (Blackshaw, 2008). Co-creation fulfils consumers' inner desires for self-actualisation, as the individual's potential for self-creation is emphasised (Nadeau, 2007). Co-creation also benefits the company as it provides unscripted feedback, which ensures a more accurate look at consumers' attitudes and opinions. Also, with their first-hand experience, some consumers are among the best innovators for companies (Blackshaw, 2008).

3.1 Challenges faced in keeping control of a chaotic, free environment in participatory advertising

The Old Spice Response campaign was successful due to the clever use of cross media integration – from posting the video in YouTube to creating a fan page in Facebook to accepting followers in Twitter. It had successfully harnessed the power of social media in creating word-of-mouth advertisement and brand awareness. By using social media, the campaign benefits from a rapid propagation of the message and, therefore, brand awareness while the consumers benefit from having the flexibility and real-time feedback as well as a platform to freely express their preferences (Plummer and J. et all, 2007). Moreover, the videos have a great concept with a flawless execution. The character chosen, actor Isaiah Mustafa, portrays the perfect balance of arrogance and charm, captivating audience heart and leaving them with a lasting impression on the brand. The success however, did not come without challenges.

In traditional advertising, the Creative always has full control while the Audience would often play the role of the receiver. In participatory culture on the other hand, the Audience does not just change the order of a multitude of stimuli, but instead has a certain degree of control over the development of the advertising campaign (Participatory Art Is Revolutionary, 2010). As mentioned previously, by introducing participation, the Audience will relate to the brand emotionally as interactivity is the key to promote empathy between the brand and the Audience. The power to control the pace in the development of the campaign at their own expense does not scare them away in the manner of intrusive ads. In addition, by spending time interacting with the advertising medium, it will promote a subconsciously-led brand recall which is critical in advertising.

Wall & Wohlman, (2010) had a talk at Eurobest 2011 and spoke about how involving people in participatory advertising would be a risk that advertisers should take. They mentioned that despite the effort to make the advertisement as perfect and entertaining as possible, the audience could just rip it apart as they wished. The fluid and flexible, yet scary, environment – just like the one the Old Spice Response Campaign was in – was what participatory advertising has to work in. It is, though, incredibly liberating as it allows room for error, change and experimentation, which traditional modes of advertising would not allow. This unique collaboration between brands and consumers would be the catalyst to promote engagement at a social level. The interaction from the Old Spice Response campaign built hype and curiosity because nobody knew what was going to happen. The unorthodox approach of venturing into the big unknown captured interest and proved that it could lead to unexpected results.

The trend in advertisements involving consumers to co-create proved to have the biggest impact in recent times. WARC's Cannes Analysis 2017 highlights trends among the campaigns entered into the 2017 Cannes Creative Effectiveness Lions, including campaign budgets, media mix, campaign duration, creative approaches, metrics and regional variation. Four themes emerged from the report (WARC, 2017). They are:

- Video in all formats is integral to effective campaigns
- Winning campaigns are moving from social-led to social as a support
- Purpose-led advertising is dominant – but issues remain
- Emotion remains central to best-practice campaigns

All four themes revolve around participation in advertising. This affirms that despite the challenges involved in participatory advertising, the merits outweigh the cons in combating anti-receptive behaviour of the modern Audience. Moving forward, the key to creating a successful and effective advertising would be to dig deep into intrinsic motivations to increase engagement and participation in the Audience. Only then, will the Audience be engaged long enough for the brand to leave a subconscious impact that could lead to effective advertising.

4. Co-creating Advertising Campaigns in a Participatory Environment in the Context of Singapore

The earlier sections gave an overall outlook on how the rise in participation culture works and influences advertising today. As such, it provided a good understanding on modern advertising trends and techniques to counter the changing behaviour of the Audience.

It was discussed, too, how the Internet has changed the advertising industry and the way people communicate and shed light on the importance of a two-way communication in creating effective advertising campaigns today. As such, co-creation was examined to understand its role in affecting consumers' buying patterns after having engaged with the CGA campaigns. The study then looked at the application of co-creation on social media networks and discussed the challenges faced in keeping control of the chaotic environment.

Whilst the findings from earlier provided a good understanding of the co-creator role the Audience play when creating effective participatory advertising, they were mainly based on the perspectives of western countries which have very different cultures and interests in comparison to Singapore. As such, a qualitative study was conducted to examine the co-creator role that the Audience play in a participatory environment when creating participatory advertising with the Creative in Singapore. The series of interviews with nine key advertising professionals from Singapore were carried out to also examine if co-creation is an effective advertising method to use in digitally savvy and connected Singapore. The interviews also shed light on the future of advertising in Singapore to enable the creative professionals to produce effective participatory advertising campaigns that will truly resonate with the audiences. The selection of these nine award-winning Singaporean advertising professionals was based on either having created advertising campaigns which were mostly co-created in a participatory environment and leveraging on the power of social media networks or their strong opinions on co-creation in Singapore.

Name	Designation	Number of Years in Advertising
Ang Shengjin	Creative Director	15 years
Shum Qihao	Creative Group Head	10 Years
Marcus Lim	Senior Art Director	8 Years
Marcus Yuen	Art Director	6 Years
Kooichi Chee	Art Director	6 Years
Larries Ng	Junior Art Director	3 Years
Roxane Wee	Junior Art Director	3 Years
Kimberlyn Codeiro	Junior Copywriter	3 Years
Dan Chia	Junior Copywriter	3 Years

Interview Questions		Objectives
Q1.	In the context of Singapore, what is the success rate of an advertising campaign that involves the Audience as the co-creator in a participatory environment?	The objective of this question was to provide insights into the collective effort between the Creative and the Audience in creating effective participatory advertising in Singapore.
Q2.	How cautious must the Creative be when co-creating an advertising campaign with the Audience in a participatory culture in Singapore?	The objective of this question was to provide key considerations to overcome the challenges faced in gaining control of a chaotic, free environment in participatory advertising in Singapore.
Q3.	At what stage of the campaign is it best to involve the Singaporean Audience in co-creating an advertising campaign? Why?	The objective of this question was to find out how co-creation could be pushed to its highest potential when creating participatory advertising in the context of Singapore.
Q4.	What is the future of advertising in Singapore?	The objective of this question was to provide insights into the future of advertising in Singapore.

Insight 1	Insight 2	Insight 3	Insight 4
High success rate	Collective effort should weigh more on the Creative	Big idea is still king	Consumers are more likely to trust recommendations (word-of-mouth)

Findings for Interview Question 1

Consideration 1	Creatives must facilitate and monitor responses generated by the Audience
Consideration 2	Ensure a two-way communication is created
Consideration 3	Have a contingency plan
Consideration 4	Be truthful and upfront about the intent of the campaign.
Consideration 5	Rope in social media influencers, celebrities or famous people to help kick-start and put the campaign on top of everyone's mind
Consideration 6	Creatives to manage campaign expectations
Consideration 7	Engage the Audience in intelligent conversations or creative expressions to increase participation
Consideration 8	Offers incentives to the Audience for their participation
Consideration 9	Leverage on social media to increase success rate
Consideration 10	Idea must always draw relevance back to goal of the campaign.
Consideration 11	To always consider Singapore's unique multi-racial and multi-religion culture so as to ensure the idea does not trigger any sensitive issues or topics.

Findings for Interview Question 2

Pre-Launch Stage	✗
Launch Stage	✓
Post-Launch Stage	✗
No Right Formula	✓

Findings for Interview Question 3

Insight 1	Audience and social media are two most powerful tools for the advertised brand in the future
Insight 2	Entertainment is the future of participatory advertising in Singapore
Insight 3	Campaign will take on the entertaining, smart and thought-provoking or true to life approach
Insight 4	Advertising will become more real as relevant issues are leverage to make brands more personable
Insight 5	Audience will take on the role of a moderator or watchdog

Findings for Interview Question 4

4.1 Understanding the collective effort between the Creative and the Audience in creating effective participatory advertising in Singapore

While co-creation in participatory advertising in Singapore is deemed a successful advertising approach, it should not be an equal joint effort. Instead, the collective effort should weigh more on the Creatives. In addition, there should be a contingency in case the Audience is not responsive, which is often the case because Singaporean Audiences tend to prefer to be spoon-fed with easy and convenience contents.

Participatory advertising in Singapore requiring less effort at the Audience's end tends to be more successful. This is attributed to Singaporeans being lazier in general when it comes to participating in advertising campaigns as they prefer just sharing stories and opinions in text form. However, they are nevertheless very opinionated and would not hesitate to voice their opinions on social media platforms, a key factor for successful co-creation. The success rate of a participatory advertising could be high in Singapore, if the Creative understands the audience landscape and is smart enough to mould and optimise the creative work around them. Thus, it is crucial that the Creative make it as easy and convenient as possible for Singaporean Audience in order to ensure the success of participatory advertising in Singapore.

Participatory advertising campaigns that involve the Audience could be very successful, especially in the digital age. However, in order to involve the audience, the Creative must first arrive at a very good idea that will naturally garner participation from the Audience. Idea is still king in the context of Singapore and how the Singaporean Audience receive advertising messages. The success rate of the campaign is dependent on how catchy and engaging the idea is with a clear objective and goal of the campaign. Past successful participatory advertising campaigns in Singapore have shown that user generated content is powerful because word-of-mouth is still the most effective referral, even in the digital age. In fact, consumers in Singapore are more likely to trust recommendations from another person over branded content.

4.2 Considerations when the Creative and the Audience co-create participatory advertising campaigns

A campaign that relies on user-generated content (UGC) to determine the success of the campaign is always a gamble in Singapore. That said, Crea-

tives must be mindful that content that is user-generated should always be regulated. This means it requires them to be constantly online and react to every content that is generated by the Audience. Different campaigns have their end objectives set by the clients or the brands. Hence, each campaign has to be developed differently with a "Consumer Journey", which requires targeting the campaign goals differently at each touchpoint. Successful advertising today is about creating a two-way communication between the Creative and the Audience. It is also important to have a contingency plan in case user participation is low or does not turn out as projected. More importantly, the idea should also be engaging and relevant to increase participation and meaningful user-generated content from the Audience, which will then add value to the advertised brand, product or service.

One of the key considerations that the Creative should bear in mind when co-creating a participatory advertising campaign with the Audience is the approach to entice the Audience to participate. It must be genuine and sincere. Creatives must always be truthful and upfront about the intent of the campaign as when the Audience feel cheated, they will start to leave negative feedback and a collectively voice will result in very bad press and do more harm than good to the advertised brand. Another consideration, when co-creating a participatory advertising campaign, is that Creatives must be realistic with their expectations. One cannot expect the campaign to sky rocket with just participation from the average Singaporeans. Instead, Creatives can engage social media influencers, celebrities or famous people to help kick-start and put the campaign on top of everyone's mind. This will help create awareness for the campaign and in return promote participation from the Audience. Leaving it to chance that the campaign will be picked up by the Audience should never be part of the advertising plan. On being realistic with the expectations, Creative should always consider the feasibility of the participatory action. For example, getting the Audience to do a flip on a BMX is going to garner lower participation rates than pouring a bucket of ice water over their heads, as seen in the phenomenon Ice Bucket Challenge which went viral in Singapore. Another important consideration to take when co-creating a participatory advertising campaign is that creatives must not treat the Singaporean Audience like adolescents. The Audience will more likely want to connect with the brand on a deeper level when the Creative allows them to participate in intelligent conversations or creative expressions. The Audience will also appreciate that their efforts

be rewarded in one way or another. Incentives can motivate them to participate and may not necessarily be monetary.

The success of a participatory advertising campaign is a collective effort, not only with the Audience. The Creative, Strategist and Suit must also work together to devise an action plan ahead of the launch of the campaign, in order to be prepared for all possible scenarios and drive the campaign to its desired goal. Social media should also be tapped on, especially with the ease of Hashtags and social media channels. Additionally, when brainstorming for ideas for a participatory advertising campaign, the Creative should not be restricted in their thinking. However, it is critical that the idea must always draw relevance back to goal of the campaign. In addition, the Creative needs to consider Singapore's unique multi-racial and multi-religion culture to ensure the idea does not trigger any sensitive issues or topics.

4.3 Pushing co-creation to new heights when creating participatory advertising in the context of Singapore.

In the context of Singapore, the launch stage of the campaign is deemed the most optimal to involve the Singaporean audience in co-creating a participatory advertising campaign. This will give the Creative more control over the campaign, seeing that Singaporeans are rather opinionated. In addition, participation from the Audience will work well, as sustenance after the main idea is launch. Thus, it is not necessary to involve the Singaporean Audience at the start of the campaign, in this instance, the brainstorming stage. However, consumer insights are key to deriving a good idea that will resonate with the Audience. For example, the campaign for Ion Orchard, one of Singapore's iconic shopping Malls was done based on crowdsourcing ideas for its name at the initial stage of the campaign, which was very successful and garnered many entries from Singaporeans.

4.4 The future of participatory advertising in Singapore

Moving forward, the Audience and social media will be the most powerful weapon a brand can have because Singaporean consumers turn to each other on social media for affirmation. They want to be heard and be able to make an impact on other consumers' buying habits. Singaporeans in general do not hate advertising, they hate bad advertising. So, if a cam-

paign is entertaining, smart and thought-provoking, they will appreciate them. That said, entertainment will be the future of participatory advertising in Singapore, of which the Audience's role would be one to spread the word like how they would share articles and clips about their favourite movies or shows to propel the campaign.

In addition, content in terms of social or digital would be the future, whether social or digital. Creative agencies are slowly pushing the craft to create campaigns either more realistically with either a documentary or true to life approach, or really entertaining by breaking the mould of the traditional 15s or 30s video spots. Advertising will become more real as the Creatives leverage on relevant issues to make brands more personable. On the flip side, the longevity of each advertising idea is becoming shorter as the speed of which the Audience consume content increases. As a result, campaigns are no longer evergreen and timeless.

As brands start listening to their Audience more, participatory advertising in Singapore is going to become more reactive. The Audience will take on the role of a moderator or watchdog. Brands will constantly try to push out content to echo their Audience's thoughts and feelings, while the Audience will keep brands in check by calling them out should they stray from their core values.

5. Conclusion

In conclusion, brands that own the future will be those that open themselves up to co-creation regardless of the stage of the campaign, as long as the earlier considerations as discussed have been taken into account. Reason being, traditional methods of advertising are no longer as effective as they used to be. The Singaporean Audience is becoming more critical toward brands, which means that trust, authenticity and transparency are key factors to also consider in advertising. The active consumer of today demands a two-way communication with companies. Nadeau (2007) clearly stated that today's audience isn't listening at all – it is participating. With every minute of people's lives immersed in some form of media, they want to be engaged and not assaulted. Thus, in order to survive in a fierce and competitive market, collective efforts to create effective participatory advertising between the Creative and the Audience are more important than ever.

Technological innovation will continue to redefine the Singapore advertising landscape and the Creative will need to keep up with it in

order to match the Audience's level of conversation in a participatory culture. With more platforms, devices and easy to use software popping up, the Audience are resourceful and well-equipped with the tools and avenues to express themselves. That said, the role of the Singapore Audience has slowly shifted to a co-creator from a mere receiver of advertising messages. Instead of advertising creating trends and cultures in Singapore, the Audience today will be the ones to define them.

The future of participatory advertising in Singapore will see more purpose-led campaigns that tend to use "human-centric mediums" like social, digital and experiential to get the Audience to share, participate and act. Social media will no longer be the only platform to connect with the Audience. Co-creation-specific platforms, similar to Kickstarter, will move in as new players. The new advertising world will value the power of word-of-mouth. As such, campaigns will move from social-led to social as support and emotion will remain central to best-practice campaigns.

All in all, the shift in the way the Singaporean Audience and the Audience in general communicate due to the digital revolution now calls for a collective effort between the Creatives and the Audience to produce effective participatory advertising campaigns.

Kathryn Shannon Sim
Lecturer, Lasalle College of the Arts, Singapore
kathrynshannon.sim@gmail.com

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Research Prototyping, University-Industry Collaboration and the Value of Annotated Portfolios

Roderick Walden, Stefan Lie, Berto Pandolfo, Anton Nemme

Abstract

The purpose of this paper is to describe how a team of academic-design practitioners working on a university-industry collaboration (UIC) project, used the method of *research prototyping* documented in an *annotated portfolio*, as a way to meet the dual need of contributing to the academic discussion and, problem solving through design practice. The annotated portfolio enables knowledge transfer and knowledge sharing, integration of new knowledge through research prototypes and a way of retaining knowledge for possible application in the current or future projects. During the process of conducting the UIC project, a team of three academic design practitioners working in product design research recorded images of prototypes constructed and catalogued those images to be systematically transferred to the annotated portfolio document. The entire body of work was catalogued for analysis (both during and after key project stages) to integrate knowledge generated through research prototypes. This paper will focus on the role of research prototypes constructed as part of the project, the classification of those prototypes recorded in photographs and the function of their arrangement in an annotated portfolio. Academic design practitioners working in collaboration with industry partners do not specialise in particular fields of application, such as furniture designers, medical product designers or in-house product designers. Instead academic design practitioners perform in a similar manner to the consultant designer who is required to quickly master diverse sectors on a continuing basis. The academic team is further distinguished by their focus on research in emergent fields that defy classical categorisation. Due to this, the methodologies through which they build new knowledge in areas of expertise that they're not practiced in, collect this knowledge and portfolio this knowledge is a unique commodity. In the field of design research for UIC projects, more needs to be understood about recording knowledge integration and the role of research prototypes. This research is important because it provides an understanding of how academics may record and contribute new knowledge through UIC projects, where prototype construction is the central research device. Further we propose a method for documenting UIC projects that could be used to help develop the expertise of the academic partner.

Theme: Alone
Keywords: academic-design practice, university-industry collaboration (UIC), annotated portfolios, design research, product design

1. Introduction

The purpose of this paper is to describe how a team of academic-design practitioners working on a university-industry collaboration (UIC) project, used the method of research prototyping documented in an annotated portfolio, as a way to meet the dual need of contributing to the academic discussion and, problem solving through design practice. There are a number of theoretical models that propose ways of managing the combination of design practice and knowledge generation in design research. For example, concerning design *as a part* of research in the generation of theory through prototyping, Stappers (2007) proposes a model that acknowledges the effect of generative and evaluative cycles that direct the development of a central 'product' (which may be a physical prototype). And that this relationship is informed by diverse disciplinary knowledge gathered at the formation of the process as well as by new knowledge brought in as a consequence of the process in order to return insights into those disciplines. UIC projects may be described in a similar way, in that there is knowledge brought in at the start of the project both by the academic team and the industry partner. There is a central 'product' and there is a process that develops symbiotically as knowledge is transferred, integrated, applied and developed. UIC projects must return value to the academic discourse and, we believe, in doing so can represent a unique opportunity for industry. It is important that if UIC projects, as a form of practitioner activity, are to managed as academic research projects that they be knowledge directed, systematically conducted, unambiguously expressed, make methods transparent and make knowledge outcomes that are transmissible (see Archer, 1995). The paper describes a project by the IPD-R Research Unit at the University of Technology Sydney in the Product Design Program that has set an academic focus that frames knowledge directives, as described below:

> The IPD-R Research Unit was established to support local small-to-medium manufacturing business (SMEs) develop innovation strategies connected with new product development. The research unit

comprises of a team of academic practitioners conducting research in product design and manufacture. And the directives of the unit are aligned with the individual specialisms of the team members that combine through collaborative research activities conducted by the unit including for UIC product design projects. Broadly, the IPD-R Research Unit is concerned with strengthening a base for local product design and product innovation for Australian industry and addressing the technical constraints associated with the decentralisation of product manufacturing. The unit operates with a focus on local SME (and micro) business specifically concerned with the production of physical products. The particular specialisms that are used to activate these broader objectives and in-turn nurture the connections between our practice and ability to make contributions to knowledge are:

1. Decentralised manufacturing
2. Micro-business / making
3. Physical interaction with 3D products
4. End-use part production from 3D Printed (AM) polymers
5. Creation of knowledge and intellectual agency through product design practice

Using an example UIC project conducted by the IPD-R Research Unit, the paper provides an understanding of how academics may record and contribute new knowledge through UIC projects, where prototype construction is the central research device. Further we propose a method for documenting UIC projects – a form of annotated portfolio – that could be used to help build a cohesive UIC practice, and develop the expertise and agency of the academic partner.

2. Literature

The connection between research prototyping and university-industry collaboration (UIC) in product design research is one that requires closer investigation in order to further develop into a more stable academic design practice. A number of barriers to successful UIC have been identified including those related to differences in the orientations of industry and universities (Bruneel, D'Este & Salter, 2010). The growth of universities has been dependant on the creation of reliable and public knowledge

(Merton, 1973) and academics typically wish to create knowledge and ideas that will be acknowledged by their peers (Brown and Duguid, 2000). Conventionally, industry creates 'private' knowledge and seeks to appropriate its economic value for competitive advantage (Teece, 1986). In this context, industry conducts research perceived as being valuable for new product or service development for their customers (Nelson, 2004).

2.1 UIC and Research Prototypes

Looking more closely at product design methodology, prototyping is an important research technique in both academic and industry practice and has been described as a central intersection between design research and design practice (Weensveen & Matthews, 2014). Further, as part of a structured exploratory process, prototyping is the only way to understand touch, materials, shapes and interactive features and represent a stable way of inviting collaboration at even the formative stages of the design process where hunches and small discoveries are tested (Koskinen et al. 2011). As such, prototyping may represent a way for UIC product design projects to overcome some of the aforementioned barriers, as its recognised as a valuable research technique in both academic and industry research and it provides a means of collaboration throughout the project. However, the function of prototypes in academic research and industrial research are constructed for different reasons. A recent paper by Koskinen & Frens (2017) distinguishes *research prototypes* as 'theoretical objects' created to test concepts that respond to theoretical literature, from *industrial prototypes* that are created to test issues related to commercialisation such as manufacturability and marketability. Observing and being upfront about these differences is important. Inter-organisational trust has been identified as an issue for UIC and that building a trust-based relationship will improve the capacity of universities and firms to work together to resolve problems and lower orientation-related and transaction-related barriers (Bruneel et al. 2010). Is there a way to manage prototyping activity in UIC projects so that the objectives of both partners can be met? As Archer (1995) pointed out, practitioner activity in academic research must be knowledge directed, systematically conducted, unambiguously expressed where data and methods are transparent and knowledge outcomes are transmissible. The concern then, is for knowledge management through practice. UIC product design projects may represent, what Cowan & Jonard (2009) term a joint innovation alli-

ance where partners combine 'knowledge stocks' to create new knowledge. They determine that the success of such a process is dependent on how well the alliance can secure knowledge complementarity (2009). Given its role in the successful conduct of both academic product design research and industry practice, prototyping that attempts to combine 'knowledge stocks' may be a means to control the development of knowledge complementarity and new knowledge development. And that knowledge may be developed such that its actionable in different ways. Frens (2007) notes:

> "Knowledge on two levels can be gathered when researching product design. We can research aspects of the products themselves, such as form or interface, but we can also research the process of how these products are generated. Products are designed to explore the implications of theory in context. The resulting products are subjected to experimentation in real life situations to understand the complex relationships of humans and designed reality. The assumption underlying the research-through-design approach is that knowledge gained from these products, through experimentation, can be generalised in the form of design specifications for future products and in new theory or frameworks" (Research through design: A camera case study, Frens, 2007).

The academic team needs to manage this process. It has been suggested that for achieving innovation outcomes in interorganisational collaboration portfolios that capture different though complimentary arrangements, can play a supportive role (Faems et al., 2005). Formalising the process of UIC projects, by the academic team is also noted as important for internal value creation. We may consider the academic research unit working in a UIC project as an innovation intermediary that enables their partners to leverage external technologies and knowledge. And it has been found that for innovation intermediaries to perform these tasks successfully they must generate internal value for themselves (De Silva et al. 2016). The research strongly suggests that the success of continued UIC is dependent on the ability of the university research unit to define their internal value and by extension their knowledge-based practices (2016).

The Academic Design model presented by Dorst (2013) argues the need for new models of practice to enable connections between the 'aca-

demic discussion' and 'design' to produce concurrent innovation and knowledge outcomes. And C-K Theory (Hatchuel & Weil, 2003 cited in Hatchuel et al. 2016) proposes a general framework of concurrent concept (C) and knowledge (K) useful in joint innovation projects and particularly for the improvement of existing methods or development of new methods of practice. C-K Theory also requires 'portfolios' to be kept so that connections between concepts and knowledge can be developed in an industrial context and as such may provide a useful point of reference for constructing annotated portfolios in UIC projects.

A few years ago, Bill Gaver and John Bowers (2012) offered the concept of the *annotated portfolio* as a means for explicating design thinking that retains an intimate indexical connection with artifacts (prototypes)" while also addressing broader research concerns (2012). Annotated portfolios may represent a method for formalising UIC project collaboration, building up the internal value of the academic research unit and overcoming orientation-related barriers using prototyping as the central research device for knowledge coordination and generation.

3. The UIC Project

The IPD-R research unit at UTS was approached by an Australian SME (the industry partner) that specialises in plant propagation and supplies young plants to nurseries and growers. The industry partner was seeking a UIC so it could work with a research unit that would be capable of bringing a concept developed by the industry partner to a level at which it could be physically tested and its feasibility assessed. The project was to optimise a specific process of plant propagation through means of detaching the process from dependence on geographical location and labour which would enable production to be more flexible and cost effective.

The project ran for a period of 10 months, from March 2017 to December 2017. During that period six face to face meetings between the IPD-R team and the industry partner were held, three at the university and three at the industry partners facility. IPD-R team consisted of three research academics and two part-time research assistants and the industry partner provided the help and expertise of three of its senior staff and executive whenever it was needed.

Because the project was based on a process, the scope of the project ranged from a review of the established workflow, which uncovered many inefficiencies, to the design and implementation of a new and more effi-

cient workflow. As a result, a completely new process and workflow has been developed, supported by the design and implementation of seven new and innovative tools, all created in collaboration with both parties. The industry partner is currently reviewing the workflow and all tools and assessing them for further development, potential market deployment and using them as a means to secure large scale investment. Due the fact that a new process, workflow and set of tooling had been innovated, intellectual property protection is being investigated for several aspects of the project and therefore no specific details can be disclosed until further notice.

4. Methods

The UIC project was conducted in a dedicated studio space in the Product Design Program at the University of Technology Sydney. The studio has some simple prototyping equipment, a desktop 3D printer, computers with CAD software, bench space for meetings and prototype testing, storage and a small area for photographing prototypes. According to Koskinen (2011) the project adopts a laboratory form of constructive design research where the ability to focus on relationships between various knowledge directives. In this project, one such relationship was between the concerns associated with 3D printed parts for end-use application and physical interaction with 3D products. During the project, certain relationships are more clearly identified as being valuable for more detailed research, made possible by the particular constraints of the design problem set by the industry partner. As such a primary method in the project and the topic of this paper is the production of an annotated portfolio. The portfolio is made up of photographs of all prototypes constructed throughout the project. The photographs are kept in a computer folder accessible by all members of the research unit and at various points in the project, they are brought together into a portfolio format that records their place in sequences of enquiry that contribute both to the creation of product features useful to the industry partner while at the same time contribute to intellectual understandings associated with knowledge in fields of design research that may, for example, feature in scholarly publications in the future. The documentation includes:

1. Photographs of prototypes in sequence.
2. Code and date of prototype construction under each photograph.

3. A table of notes that identify connections between product function and knowledge directed enquiry (knowledge overlaps between practice and theory).

The intention is to ultimately increase the value of the research unit by refining the focus of our UIC engagements such that they build our intellectual agency, enable us to make contributions to the academic discussion and offer actionable design solutions for our industry partners concurrently.

5. Results

Each prototype was photographed after they were constructed. This included rough and quick prototypes that were made as part of an exploratory concept design exercise that may have been to look further into possible future designs, to support the formation of a shared vision or to challenge the team's expertise and build competency in the stated research objectives of the academic unit (see Keinonen, 2006). However, the precise classification and value of certain prototyping tasks was not fully understood at the time of their construction. Creation of the annotated portfolio – itself a reflective design project – helps the academic team better understand the nature of our practice and better define our engagement conditions for valuable UIC projects in the future. The arrangement of photographs in the annotated portfolio were located according to the sequence of their construction and positioned in a horizontal arrangement for design changes that represent a significant evolutionary step forward. And vertical for design changes that represent an incremental evolutionary change. Photographs are coded and referenced in a table that provides more information about the prototype. A sample page has been developed and is presented below (Figure 1).

The prototypes are analysed both from the perspective of meeting the needs of the industry partner and the concerns of the research unit. These are briefly tracked in the table located on each page that lists the prototype code numbers in sequence (Figure 2).

As can be seen in the table (Figure 2) there are knowledge contribution or positioning statements that emanate from the analysis of the prototyping sequence. It's important to note that by constructing the annotated portfolio as a *process* that understandings about certain issues forming part of the academic discussion in design research can be identi-

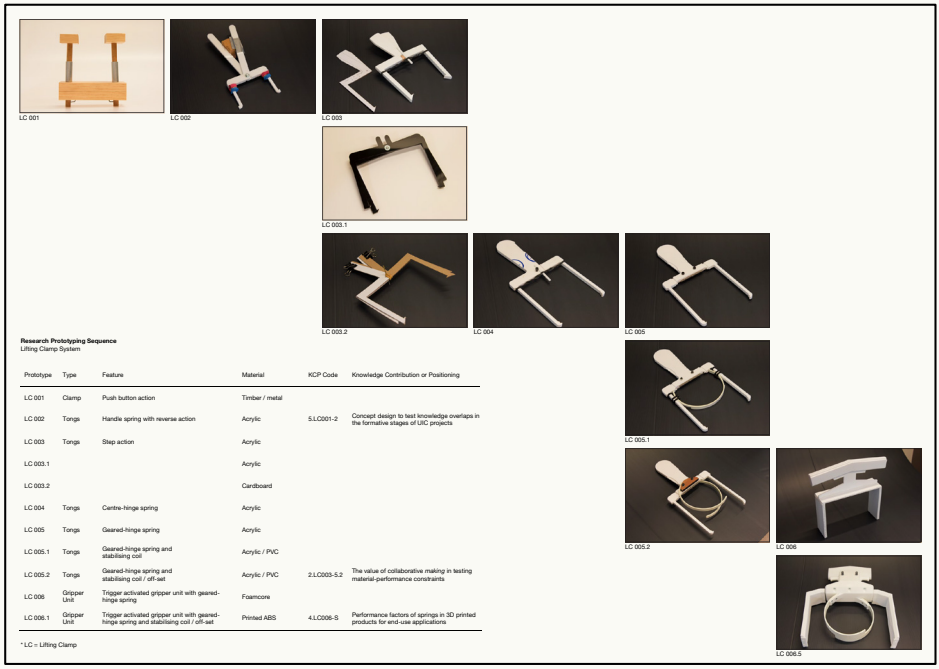
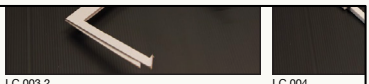


Figure 1. Sample page from the annotated portfolio



Research Prototyping Sequence
Lifting Clamp System

Prototype	Type	Feature	Material	KCP Code	Knowledge Contribution or Positioning
LC 001	Clamp	Push button action	Timber / metal		
LC 002	Tongs	Handle spring with reverse action	Acrylic	5.LC001-2	Concept design to test knowledge overlaps in the formative stages of UIC projects
LC 003	Tongs	Step action	Acrylic		
LC 003.1			Acrylic		
LC 003.2			Cardboard		
LC 004	Tongs	Centre-hinge spring	Acrylic		
LC 005	Tongs	Geared-hinge spring	Acrylic		
LC 005.1	Tongs	Geared-hinge spring and stabilising coil	Acrylic / PVC		
LC 005.2	Tongs	Geared-hinge spring and stabilising coil / off-set	Acrylic / PVC	2.LC003-5.2	The value of collaborative *making* in testing material-performance constraints
LC 006	Gripper Unit	Trigger activated gripper unit with geared-hinge spring	Foamcore		
LC 006.1	Gripper Unit	Trigger activated gripper unit with geared-hinge spring and stabilising coil / off-set	Printed ABS	4.LC006-S	Performance factors of springs in 3D printed products for end-use applications

* LC = Lifting Clamp

Figure 2. Zoomed-in section of Construction Table

fied between (or across a series of) prototypes. Essentially the research team attempts to clearly articulate the reason for moving from one way of seeing the problem (embodied in one prototype) to another way of seeing the problem (embodied in the next prototype). There are three examples indicated in the sample shown:

►5.LC001-2:
Concept design to test knowledge overlaps in the formative stages of UIC projects.

The use of '5' at the start of the code above refers to the knowledge directive, "Creation of knowledge and intellectual agency through product design practice" from the list of our research teams set of stated specialisms. LC001-2 indicates the sequence across which an interesting event took place worthy of investigation as part of that (5) research area. In this case, the particular nature of this event relates to the way that the working principle of prototype LC 001 is essentially discontinued in favour of the significantly different 'tongs' design represented in LC 002. Though not shown in this paper, there are examples in the annotated portfolio where this 'leap' in direction has occurred in the same project but with different parts of the design in the formative stages of the project. There may be something to these examples of significant design evolution that contribute to the research on determining knowledge overlaps in joint innovation projects (see Cowan & Jonard, 2009). It may also draw in new knowledge about addressing design fixation in the early phases of UIC projects and acting on "prestructures" (proposed by Hillier et al., 1972) which are solution-types deployed to solve problems in new ways by drawing on a "repertoire of design tactics" or "schemata" when limited empirical information is at the designer's disposal (see Parsons, 2016).

►2.LC003-5.2
The value of collaborative making in testing material performance constraints.

The complexities associated with orienting partner incentives in UIC projects may ease with the changing commercial environment for both entities. Leading companies are moving from the traditional R&D model to a D&R (design-led) model where design directs research and technological investment (Koskinen & Dorst, 2015). And today universities are much more entrepreneurial with the aim to contribute to national eco-

nomic development by conducting research that has commercial and industrial application (Etzkowitz et al., 2000; Martin, 2003 cited in Huang & Chen, 2016). These changes are further encouraged by government support policies such as the Australian Industry Innovation and Competitive Agenda (2014) that specifically identifies the formation of innovation strategies related to new product development and advanced production for small to medium enterprise (SMEs) as key. However, UIC product design projects with Australian SMEs often require the careful management of two competing constraints: increasing performance factors while at the same time reducing production complexity. We have found through this project that detailed collaboration with the industry partner that is largely supported by making quick (functioning) prototypes in available materials helped to balance these competing constraints. Research prototypes LC003-5.2 progressed through a making phase that might be described as a 'practice-oriented journey' (Mäkelä, 2007) framed by a series of (roughed out) research questions including how to reduce product complexity for rich interaction (a term used by Frens, 2007), yet open enough to allow rapid exploration reliant on the teams 'know-how' and collaboration with the industry partner.

▶ 4.LC006-S

Performance factors of springs in 3D printed products for end-use application.

The use of 'S' at the end of this code indicates that we are referring to a 'series' of prototyped investigations that would be detailed on a separate page. *The large number of prototypes made progress via lines of enquiry. The process is not linear and there are multiple lines of enquiry that, at times operate concurrently. As such, documenting the prototypes on pages requires a kind of tiered system of organizing information, something like the way a set of engineering drawings have top level (GA), sub-level (sub-assemblies) and base level (part drawings) to organize the detail.* The 'S' refers to a 'series', and in this case, after the concept for interaction was approved, the LC006 series involved a deep investigation of how to achieve high-level performance requirements using 3D printed parts for end-use application. At the time of writing this paper, confidentiality agreements prevent us from showing more detailed prototypes. However, there was a side investigation to test the performance of integrated 3D printed springs over bought-in mechanical coil springs to be located within the unit. The investigation proceeded via the construction of vari-

ous 3D printed springs to be printed as part of the internal geometry of the housing. These were trialed in different materials using different methods. Significantly, these have not been adopted in the current design, but they represent valuable materials research for the development of the expertise of the academic team. And therefore, form part of the annotated portfolio of this project.

6. Conclusion

The study demonstrates that the use of annotated portfolios is beneficial in the conduct of university-industry collaboration (UIC) product design projects, particularly for orienting the purpose of research and industry prototypes. The research builds upon the definition of annotated portfolios presented by Gaver and Bowers (2012) that described the annotated portfolio as a document containing annotated images of prototypes as a means of explicating design thinking and links to theory. UIC partnerships ought to strive for innovation so that the outcomes can benefit both the industry partner by way of providing new products or processes, and the academic partner in the form of contributions to knowledge that can be disseminated through publication. The annotated portfolios described by Gaver & Bowers are limited in the UIC context because the prototypes developed by their studio are predominantly linked to theory and serve as "conversation pieces or curiosities" to contribute to design research (2012). These types of prototypes have been described as research prototypes – theoretical objects subjected to a study to understand their meaning – as distinct from industrial prototypes which are constructed for practice (Koskinen & Frens, 2017). Therefore, we have sought to develop the concept of the annotated portfolio to be beneficial for UIC by using the annotated portfolio as a way of managing the overlap between research and industrial prototype construction. We consider the value of using annotated portfolios in UIC projects as broadly having value in the following ways:

1. UIC projects normally run, at a fast pace, for a number of months (this one was 10 months long). During the course of our project, close to eighty separate prototypes were produced – some representing significant evolutionary design changes and others incremental modifications. All of those investigations have some value. Without a recording system, such as the proposed annotated

portfolio method, these prototypes, the knowledge they embody and their significance to research are likely to be lost.

2. The annotated portfolio becomes a form of *knowledge* portfolio as it positions the prototypes in sequences that makes analysis of the knowledge and the practice developed via the project, transparent and transmissible. It also identifies inside the project, multiple knowledge contributions that can be potentially developed to contribute to the research focus of the academic unit. This may also help to establish a cohesive (UIC) practice, academic expertise and agency for the academic unit.

There are, however, opportunities for refinement of this method in future research. These are significantly related to the complexity associated with compiling the annotated portfolio itself. It seems necessary for the research unit to develop a system of standards to manage the vast amounts of data efficiently. The annotated portfolio ought to be compiled during the project, while connections between the academic discourse and design practice are fresh. At the same time, UIC projects are normally funded and therefore operate on a tight schedule. Based on these conditions, further research into the methods and systems for creating the annotated portfolio needs to be conducted.

Roderick Walden
Lecturer, University of technology Sydney, Australia
Roderick.Walden@uts.edu.au

Stefan Lie
Lecturer, University of Technology Sydney, Australia
stefan.lie@uts.edu.au

Berto Pandolfo
Lecturer, University of Technology Sydney, Australia
Berto.Pandolfo@uts.edu.au

Anton Nemme
Lecturer, University of Technology Sydney, Australia
Anton.Nemme@uts.edu.au

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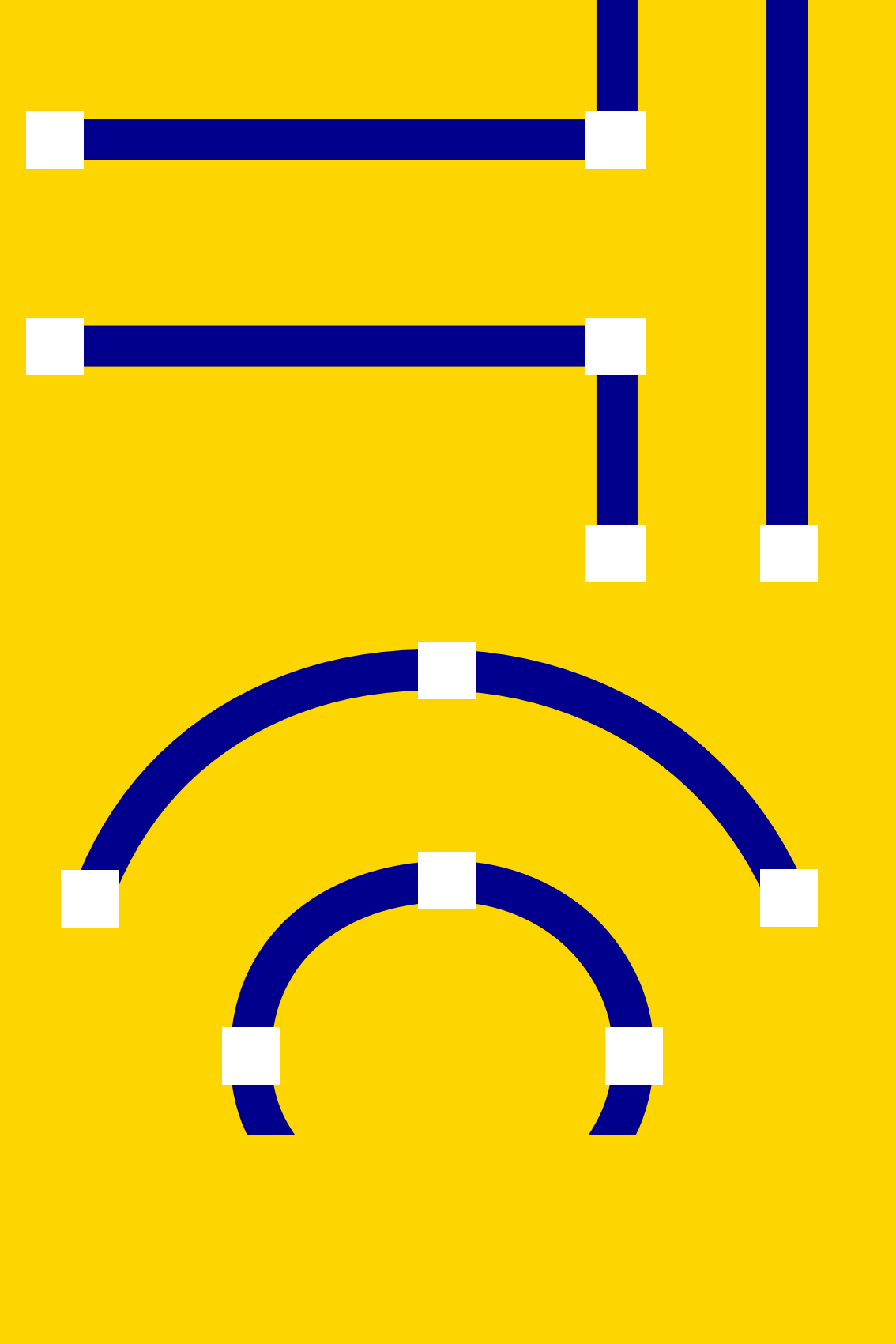
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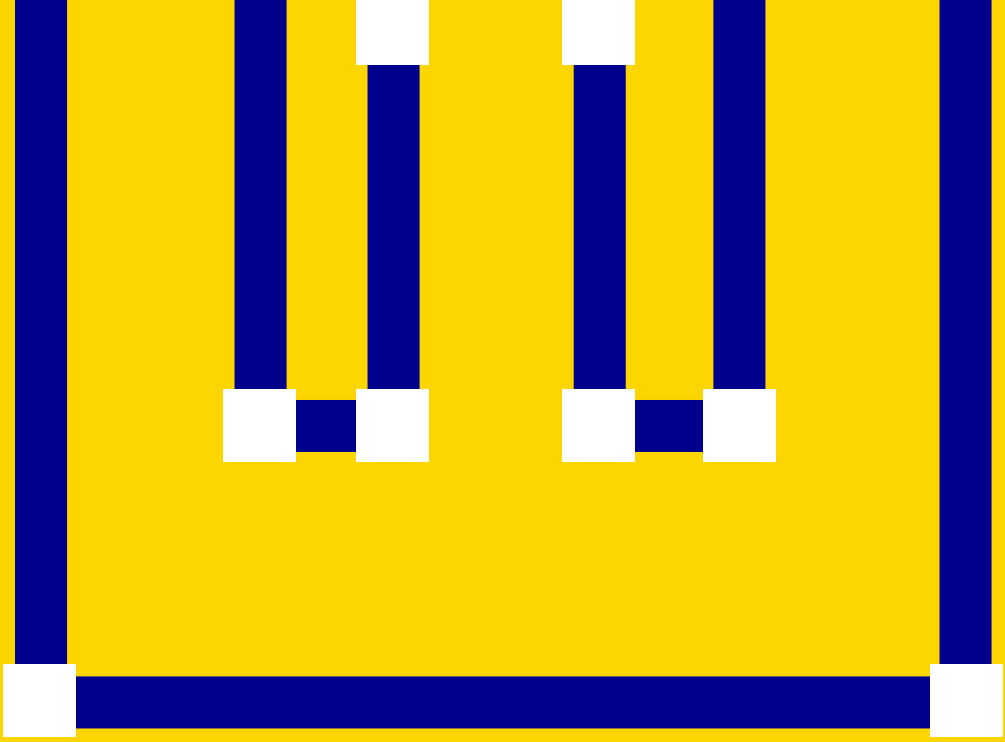
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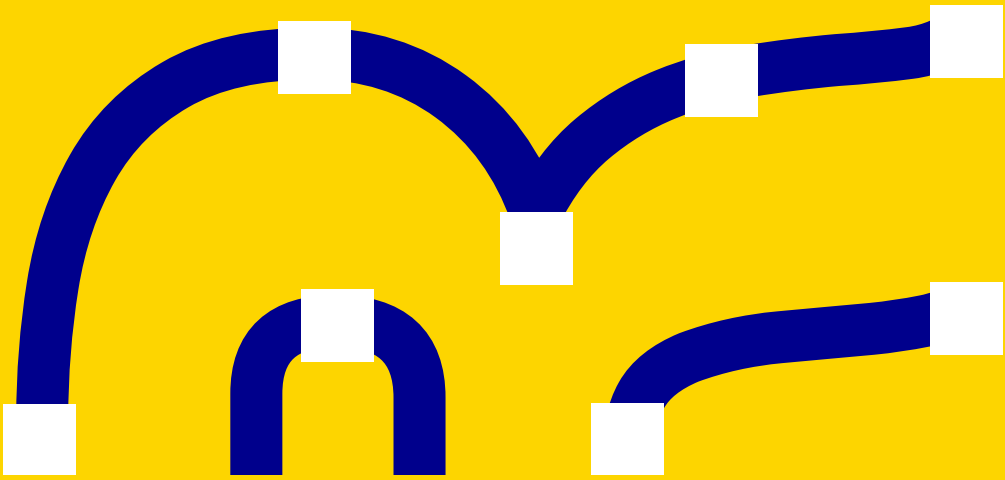
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