

ARCHITECTURE HERITAGE and DESIGN

Carmine Gambardella

XVI INTERNATIONAL FORUM

Le Vie dei  
Mercanti



**WORLD HERITAGE and KNOWLEDGE**

Representation | Restoration | Redesign | Resilience

**ARCHITECTURE HERITAGE and DESIGN | 2**  
Collana fondata e diretta da Carmine Gambardella

## **ARCHITECTURE HERITAGE and DESIGN | 2**

Collana fondata e diretta da Carmine Gambardella

Scientific Committee:

**Carmine Gambardella,**

UNESCO Chair on Landscape, Cultural Heritage and Territorial Governance  
President and CEO of Benecon,  
Past-Director of the Department of Architecture and Industrial Design  
University of Studies of Campania "Luigi Vanvitelli"

**Federico Casalegno,**

Massachusetts Institute of Technology, Boston

**Massimo Giovannini,**

Professor, Università "Mediterranea", Reggio Calabria

**Bernard Haumont,**

Ecole Nationale Supérieure d'Architecture, Paris-Val de Seine

**Alaattin Kanoglu,**

Head of the Department of Architecture, İstanbul Technical University

**David Listokin,**

Professor, co-director of the Center for Urban Policy Research  
of Rutgers University / Edward J. Bloustein School of Planning and Public Policy, USA

**Paola Sartorio,**

Executive Director, The U.S.- Italy Fulbright Commission

**Elena Shlienkova,**

Professor, Professor of Architecture and Construction Institute of Samara State Technical University

**Luis Palmeiro Iglesias,**

Director UNESCO Chair Forum University and Heritage,  
Universitat Politècnica De València UPV, Spain

**Nicola Pisacane,**

Professor of Drawing – Department of Architecture and Industrial Design\_University of Studies of Campania "Luigi Vanvitelli"  
Head of the Master School of Architecture – Interior Design and for Autonomy Courses  
Department of Architecture and Industrial Design - University of Studies of Campania "Luigi Vanvitelli"

**Pasquale Argenziano,**

Professor of Drawing – Department of Architecture and Industrial Design\_University of Studies of Campania "Luigi Vanvitelli"

**Alessandra Avella,**

Professor of Drawing – Department of Architecture and Industrial Design\_University of Studies of Campania "Luigi Vanvitelli"

**Alessandro Ciabrone,**

Ph.D. in Architecture (University of Campania) and Territorial Governance (Université Paris X)  
UNESCO Vocations Patrimoine 2007-09 / FULBRIGHT Thomas Foglietta 2003-04

**Rosaria Parente,**

Professor in Architecture, construction and geodesy, EPU European Polytechnic University Sofia (Bulgary)

**Riccardo Serraglio,**

Professor in Architectural History, Department of Architecture and Industrial Design  
University of Studies of Campania "Luigi Vanvitelli"

**Danila Jacazzi,**

Professor in Architectural History, Department of Architecture and Industrial Design  
University of Studies of Campania "Luigi Vanvitelli"

**Sabina Martusciello,**

Professor in Industrial Design, Department of Architecture and Industrial Design  
University of Studies of Campania "Luigi Vanvitelli"

**Editorial Committee:**

Pasquale Argenziano

Alessandra Avella

Giovanni Bello

Alessandro Ciabrone

Maria Luigia Di Bennardo

Rosaria Parente

Nicola Pisacane

Carmine Gambardella

WORLD HERITAGE and KNOWLEDGE  
Representation, Restoration, Redesign, Resilience  
Le Vie dei Mercanti  
XVI International Forum di Studi

Editing: Giovanni Bello, Alessandro Ciabrone,  
Maria Luigia Di Bennardo

Il volume è stato inserito nella collana Architecture, Heritage and Design, fondata e diretta da Carmine Gambardella, in seguito a a peer review anonimo da parte di due membri del Comitato Scientifico.

The volume has been included in the series Architecture, Heritage and Design, founded and directed by Carmine Gambardella, after an anonymous peer-review by two members of the Scientific Committee.

©

Proprietà letteraria riservata

ISBN 978-88-492-3633-0

È assolutamente vietata la riproduzione totale o parziale di questa pubblicazione, così come la sua trasmissione sotto qualsiasi forma e con qualunque mezzo, anche attraverso fotocopie, senza l'autorizzazione scritta dell'editore.



Le Vie dei  
Mercanti

XVI INTERNATIONAL FORUM

WORLD HERITAGE and KNOWLEDGE

Representation | Restoration | Redesign | Resilience

Naples 14 - Capri 15|16 June 2018

## The reconstruction of an Image. The experiences of Quaroni and Piacentini in Basilicata

Antonio BIXIO<sup>1</sup>, Giuseppe DAMONE<sup>2</sup>, Enza TOLLA<sup>2</sup>

<sup>(1)</sup> Department of European Cultures and the Mediterranean (DiCEM), University of Basilicata, Matera, Italy, antonio.bixio@unibas.it

<sup>(2)</sup> Engineering School, University of Basilicata, Potenza, Italy, enza.tolla@unibas.it, ing.giuseppedamone@gmail.com

### Abstract

The study about “the modern” architecture of Basilicata is an interesting field of research. Most of these architectures have yet to be completed or during the centuries, they had been object of several transformations because of no one recognized their formal value.

In this way starting from the analysis of existent traces and from the info of archive documents, the use of virtual models allowed to restore and relive the architectonic experiences of the early 1900s. Project Ophelia is an example in Potenza (Basilicata).

In Potenza, in an area now heavily urbanized, there is an ambitious project built in 1906, which involved the construction of a hospital for the mentally ill: it consists of several isolated pavilions and service facilities. The project, designed with the most modern urban solutions and rational use of space, has been signed by the architect Piacentini and the Eng. Quaroni, but has been never completed. The research carried out on the buildings of the «Ophelia Project» aimed at creating a database of information that can be used in the implementation of restoration of the important architectural creations of the early '900.

The photographic, architectural and metric survey has been supported by the archival research.

The use of the virtual model, then, has made possible to study the project never completed in its entirety. Has been done, therefore, an integrated survey in which the traditional methods of documentation has been accompanied by an experimental model using the new tools of representation.

**Keywords:** survey, modeling, documentation, analyses

### 1. Advanced survey and representation for architecture history (Giuseppe Damone)

The tools of representation, linked to the path of knowledge in architecture survey, allows to operate important analyses about buildings, then a decomposition and recomposition of the different elements that make up a building, in order to read all the peculiarities that are settled on it, that otherwise would not be easy to read.

Every artifact conceals a number of unreported information in plans, where these still exist, but derived from construction needs, or amended. This analysis assumes an important role in the study of all those buildings where an archival data project is absent because never made or lost in time.

Getting to know a monument means being able to decompose the object built by man and, therefore, understanding the relationships between its individual parts, in addition to grasp the dynamics about the creation and the transformations of the object or parts of this.

It is therefore necessary not just reading about the macroscopic aspects, like geometry.

If the geometrical survey allows to study and, then, to know an artefact, it becomes important to conduct an historical and critical survey to understand structural dynamics that have interested it.

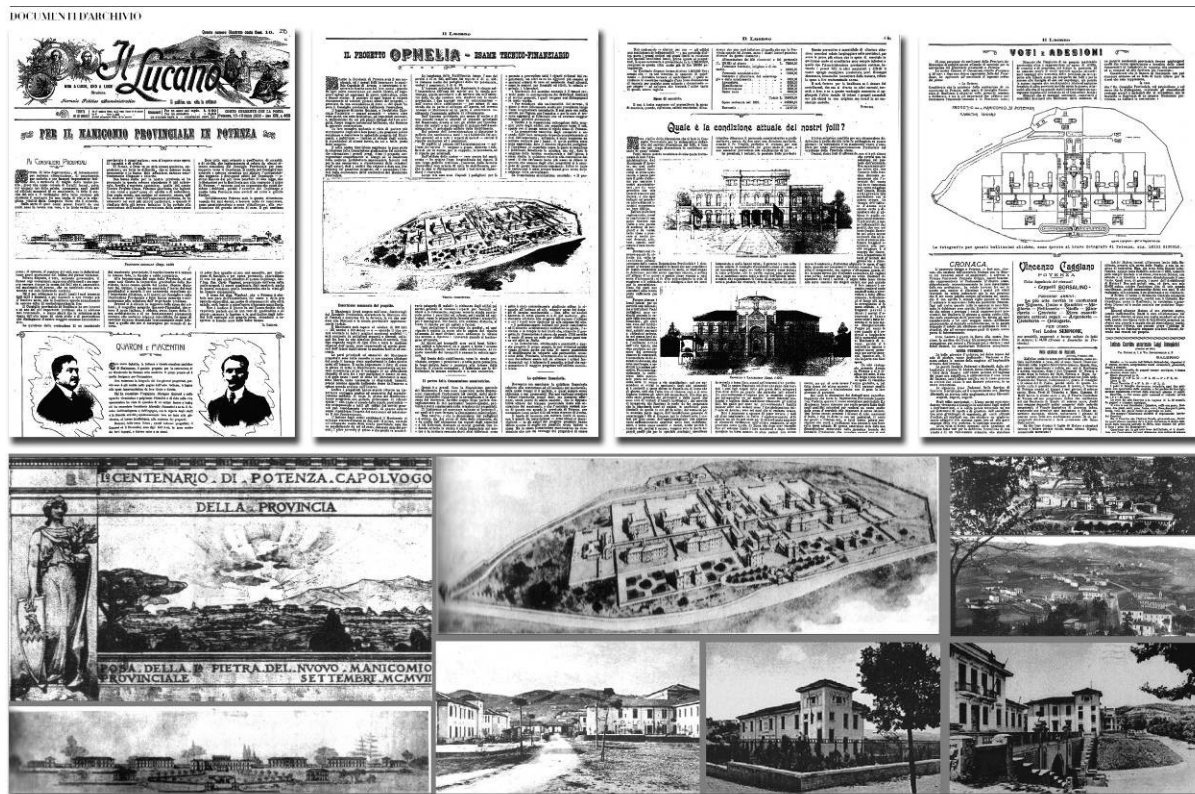


Fig. 1: Historical material on the «Ophelia Project».

It can be necessary to “query” the artifact in order to gather useful information. Survey phase, in fact, represents the basic step of building analysis, described in its simplicity or complexity. First step of careful study about buildings is the pursuit of archival documents to it referred.

State archives or Municipal ones, historical libraries and private archives, represent the main locations where track down original sources, that studied and reorganized opportunely, permit to trace a first historical profile. Secondary sources constitute an other resource for collecting news.

Indeed, a careful revision of biographical documents allows us to be able to complete the historical background, while secondary sources represent the only information resource when it is not possible to track those original down.

Written records, graphic plans as projects, or ancient photos let to be able to approach to the historical study of the building. Every architectural artifact is expression of a defined cultural context, about a specific age. For this reason, it's important not just collecting the simple metric and geometric data, but it is necessary to reconstruct history and transformations, transferring these information on drawing paper. Historical investigation has an important role in the practice of survey, because through historical knowledge it is possible to decipher and to interpret the elements that compose a building or an urban reality. Moreover a well determined analysis path is traced through it.

The knowledge of architecture history becomes therefore essential for who wants to analyze an object built by the man, where the analysis, besides allowing the understanding of statistic elements, permits to decipher all technical and constructive components.

It is necessary add other specific knowledge to a traditional survey in order to achieve a multidisciplinary study. New survey equipment, in addition to traditional approaches, allow to reproduce in virtual dimensions real buildings, besides formulating reconstructive hypothesis about ruins or architectural project never realized. To study a building or an urban area entails to analyze each element and to know lexicon, characteristics and architectural language. It become more important when the object of the analysis is an urban area where it's necessary to understand the system of relationships among its single parts. The project of whole districts, in fact, is based on a concept that evaluates all components as a system. The study about the architecture of the first half of the XX Century in Basilicata is born from this consideration, that has brought to the individualization of several projects concerned public architecture signed by engineer Giuseppe Quaroni.

Not realized or incomplete plans, ruins and scholastic building interested by meaningful transformations after the second war, emerge from archive records, allowing to trace a complete profile about planner activity. In this examination, particularly, are introduced the results of a project about an urban area of Potenza. It is the “Ophelia project”, created by a partnership among engineer Quaroni and architect Marcello Piacentini at the beginning of the XX Century, about a complex idea never completed.



**Fig. 2:** The pavilions built of the «Ophelia Project» in the first half of the 20th century.

Starting from how much really realized and comparing with the few project stored, it has been possible to complete a critical analysis using virtual models, in order to gather its original formal and functional peculiarities. The digital modeling has been the tool that has allowed a direct comparison among two realities: the original project (with survey and pictures) and real buildings (with technical drawings and virtual model renders). History and survey become parts of a same knowledge path, both fundamental to allow a complete description about the object of investigation.

Studying an urban center or an architectural artifact means to reconstruct their stories using historiography tools, recognizing some general characters that make them similar to others, but, at the same time, individualizing all intentional, unintentional or casual invariants that make them an *unicum*.

## **2. The competition and the failure to realization the «Ophelia Project» in Potenza (Enza Tolla)**

Before analyzing the project covered by this study, it is necessary to make a small digression to understand what were the causes that made it.

Since the end of the 19th Century in the Basilicata region there were no facilities suitable for suffering patients that were admitted outside the region.

On the 20th of March 1865 a Law gives to the Province the obligation to provide assistance to these patients, also confirmed in subsequent Law of 10 February 1889 and Law of 4 May 1898.

Mental disorders patients, in particular, were accommodated in the mental institution of Aversa, and the Province supports a considerable cost to take care of them each year.

In order to reduce it, it was decided to build a mental institution inside the Basilicata region, its management would have been directly controlled by the Province and the costs incurred by Cities Councils to transfer patients to structure would have reduced, to support Basilicata's economy.

Authorised by the Provincial Council, some experts identified the most suitable area for building the hospital. In particular, it was choosed an areamclose to the upper station, a not urbanized area and with an irregular elevation map.

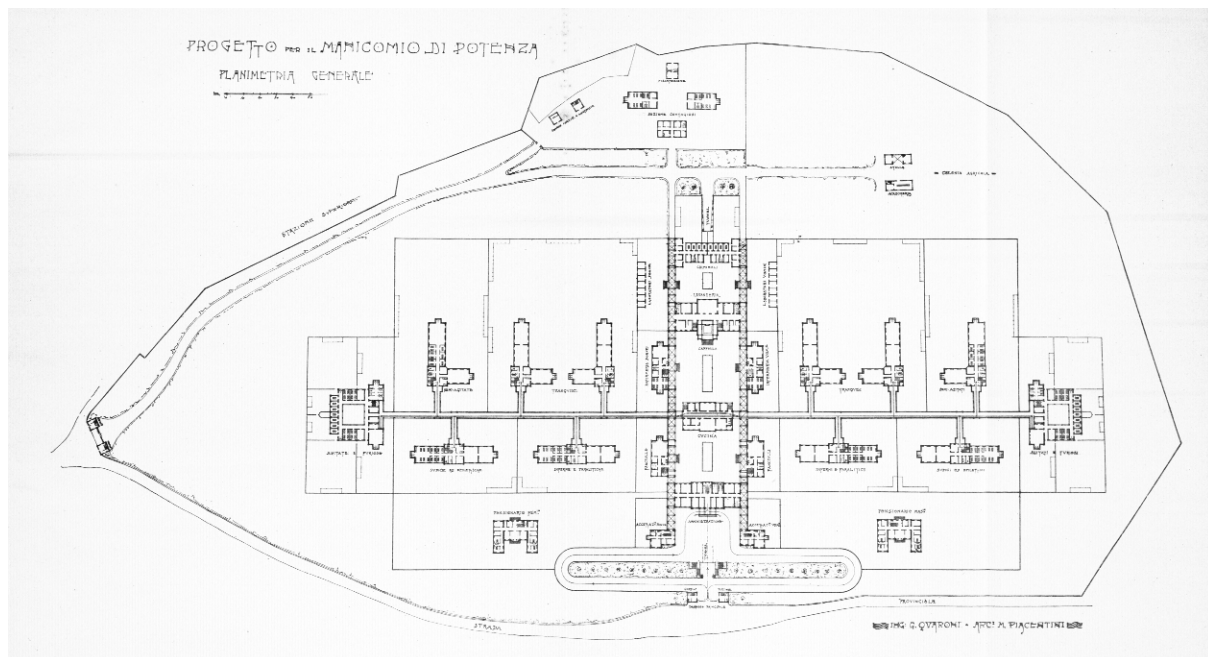
It was an upland in the North area of the city with a strong slant towards the South area. On the 29th October 1905, it was published the competition announcement to build the provincial mental institution, establishing the six-month period for submitting proposals.

This announcement stated that the new structure would be built in the «Santa Maria-Epitaffio» district also, it was supposed to accommodate three hundred psychopathic and more and to take care of them, according to specific laws. Seven proposals were arrived at announcement expire and, in August 1906, the examination board decided that the winner was the «Ophelia Project» signed by engineer Quaroni and architect Marcello Piacentini from Rome.

In particular, their project was developed on the elevation 760 where the main buildings were located. Moreover, the choice of this plan provided to guarantee an excellent articulation of the infrastructure than the road that played an important role to the entry to the service area.

According to the idea of the two designers, the mental hospital would be developed on two axes: one on Southwest direction said "about services", and the second one on South-North-direction. The whole project looked symmetric compared to the axe services, and it was developed of 229 meters from it, while it had an articulation of 450 meters compared to the axes. The medium distance between the two pavilion was about 65 meters. The main entrance to the psychiatric took place at the intersection of these axes with the Provincial road, while another secondary entrance was located in the crossing road to the station.

The two entries were linked by an inner path under the buildings of the general services. Besides, the project was composed by different single buildings, destined to: the doorman's residence, gardener's house, farmer and undertaken's residence, reception buildings for patients, administration palace, kitchen, church and laundry.



**Fig. 3:** Original plan of the «Ophelia Project» by G. Quaroni and M. Piacentini, 1906.

Moreover, the project provided a series of pavilions, separated for males and females, and for different pathologies. During the celebrations of the centenary of Potenza as main city of the region, in September 1907, the first stone of the project was posed.

One of the first problems found for the realization of the ambitious project had been the financial one.

In fact, the proclamation didn't establish limits of expense and well soon they realized that the project, even though functional and in conformity with demand requisite, was too expensive.

At the first time, it was decided to proceed step by step giving priority to the most necessary pavilion, and then to proceeds to the realization of those less urgent, and completing the project with all the other buildings finally. Once starting buildings construction, financial problems were still there, and after few years the pavilions realized was destined to other functions.

Given that there was an enormous request of public housing and considered that it would not be possible to complete the project, it was decided to convert those realized pavilion in households.

### 3. The info-graphic model to study the «Ophelia Project» (Antonio Bixio)

The info-graphic model represents effectively a phenomenon or a real situation. From this general definition that collects all types of model, it place the info-graphic model between the most and modern devices about analysis of the architecture, city and territory, as a link among reality and analytic, graphic and planning process. The innovation of representation tools weigh on documentary production phases and on the graphic reproduction of survey data. In fact, in addition to survey design representation, there are three- dimensional models to thematize, in an intuitive way, data from knowledge path. The possibility to shape the reality to communicate allows to create digital models representing a forgotten or a never existed reality, in a very reliable form.

The info-graphic model is composed by graphic design, identified by traditional representations (as Monge projection, axonometric projection) becoming part of them.





Fig. 4: info-graphic model for the reconstruction of the church of the «Ophelia Project» in Potenza ever realized, as per archival documentation.

Graphic traditional projects (maps, perspective drawing and sections) are already sufficient to represent a built reality integrally and precisely, but technological innovation and info-graphic model are able to improve communication and knowledge, making it more intuitive and immediate.

Instant disclosure of existing architecture or designed is realized through global communication, which is organized through a network, without limits of space and time. Experimentation of innovative tools to make urban and architectonic survey is a key step in research activity and in teaching field related to the representation.

In fact, technology simplifies some reconstruction operation about a non-existent reality, through virtual design, or through the realization of digital models to touch what doesn't exist.

About the benefit of info-graphic model, after a traditional graphic analysis (bi-dimensional), as a planning tool or studying reality, it would be expected some trouble about its suitability and its use during the invention phase or analysis of architectural form. In fact, cognitive process, under an analytic path, puts together several data which are composed during a broken-down of the reality in partial and precise representation.

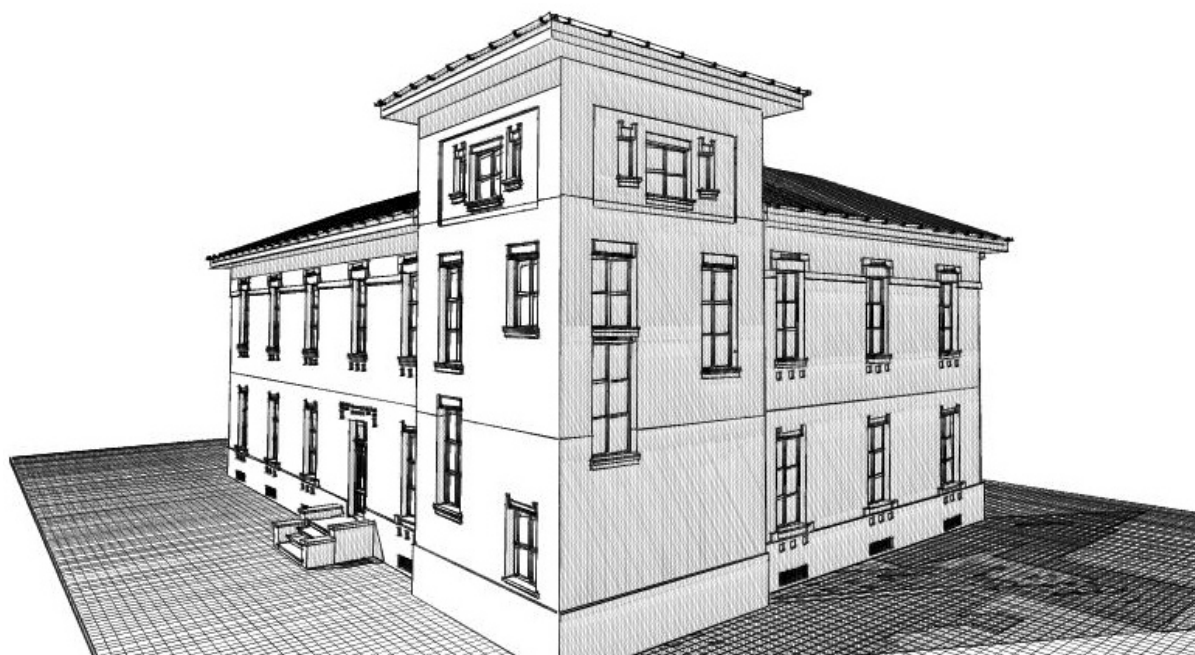
Being the architectural survey a non-default path, which is full of unexpected events and non-programmable conditions, it is necessary that the graphic analysis is developed gradually, to acquire useful information and useful tools. Even if the model is made accurately, taking care about each element, it will be impossible to give us all the information linked to the traditional representation in different graphic scale.

For this reason, it is necessary to separate the step of traditional graphic analysis made on bidimensional CAD from the info-graphic modeling to analyze. This approach, chosen in the analysis of real buildings, allows to follow a knowledge path, using complementary but interconnected tools.

Although survey info-graphic model is not the unique analysis tool, it eliminates tangible reality and resends to an untouchable reality. It is evident in the "Ophelia Project", in Potenza, that put the info-graphic model in an important role about the analysis of the architecture and the city.

In fact, the same model has been the protagonist of virtual reconstruction of non-existent reality. The model has become a deepening tool to study archival documents, depicting the original project on 1906.

The rendered model, comparing with ancient and modern pictures, allows to match directly the original "Ophelia Project" and the realized one. The comparison between survey design and archival design, as well as the match among pictures and rendered, makes possible a deep analysis about the production of the architecture and the city, and about how a project can have an interesting history.



**Fig. 5:** Above example of a non-rendered digital model; below a info-graphic model rendered, with high definition photorealistic.

For this reason, the info-graphic model is good to communicate and to disclose. The model, used to conduct an historical and critical analysis of the architecture and the city, born from the interaction between vector graphic (typical of info-graphic modeling) and raster graphic (related to digital form). In fact, the info-graphic model is composed by:

- digital model based on mathematic and geometric parameter that defined the shape in CAD context;
- physical models of real light that allow to realize virtual scene with shadows, direct and undirect light;
- raster components defined on fotografic maps, that make textures of digital model elements.

This model breakdown is realized by three operative moments after the rendering creation:

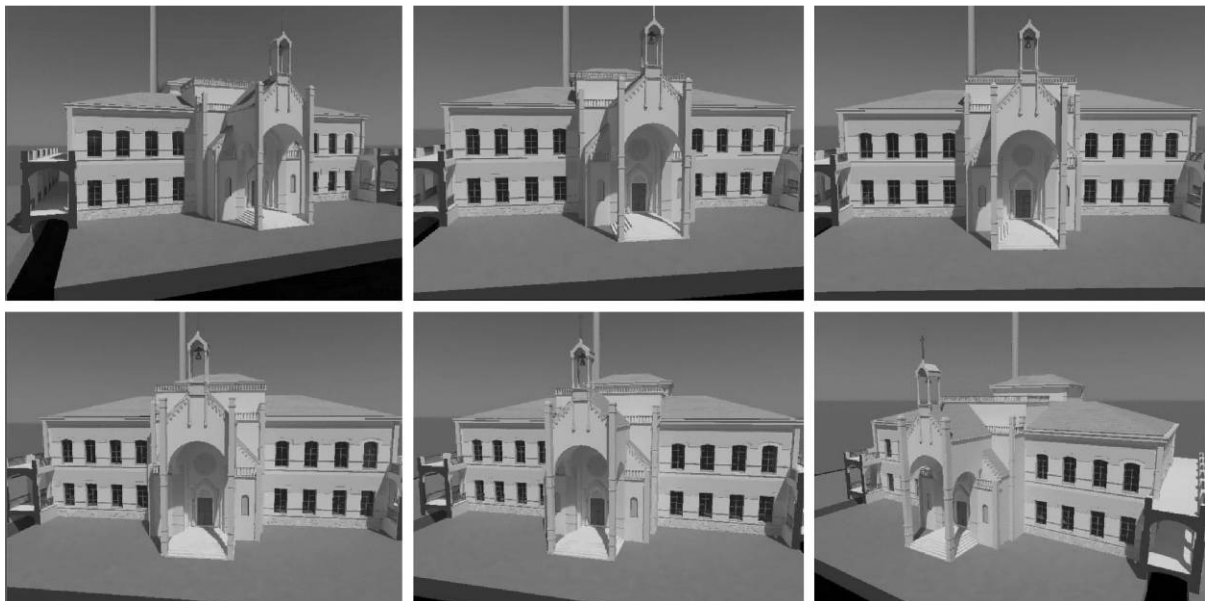
- management of geometry, shape and areas, as well the formal reproduction of the reality;
- inclusion of light sources in different types and parameterization of indirect light;
- allocation of materials features to parts of the model as well as their physical behaviour to lighting input and to their cromatic and texture one.

Thanks to the control of this parameters, you are able to choose easily the special type of representation of rendering. In fact, it is not necessary to realize in a photorealistic way your rendering, perfectly. The photorealism has for sure a lot of potential, but sometimes, their are not usefull to analyze the volume or solar irradiance during the day, or for a “plastic” representation.



**Fig. 6:** info-graphic model with a photorealistic definition of some of the pavilions.

It's important to define first of all the level of the details that you wanna give to your rendering given that each parameters' change could modify the deadline of your creation. In this case, in particular, both kind of renderization are been used in order to have an unique global vision of the project. For the pavilions that were been realized, was preferred a photo-realistic definition to catch an original urban articulation of the project. Instead, for all these buildings never realized, a plastic representation was choosed to reproduce the volume and their behaviour under the light, as well as the peculiarity of this architecture.



**Fig. 7:** Frame sequence of the virtual reconstruction of the Chapel.

### **Bibliographical References**

[1] BARBA, Salvatore. *Tecniche digitali per il rilievo di contatto*. Salerno: Edizioni CUES, 2008. ISBN 978-88-95028-23-1.

[2] BIANCHINI, Marco. *Manuale di rilievo e di documentazione digitale in archeologia*, Roma: Aracne, 2008. ISBN 978-88-548-1826-2.

- [3] BIXIO, Antonio. *I modelli info-grafici per il rilievo architettonico*. In CONTE, Antonio (a cura di). *Recupero e tradizione costruttiva*. Potenza: Edizioni Grafie, 2008.
- [4] BIXIO, Antonio, TOLLA, Enza. *Un laboratorio per il rilievo*, Salerno: Edizioni CUES, 2012. ISBN 978-88-97821-31-1.
- [5] BIXIO, Antonio, TOLLA, Enza, DAMONE, Giuseppe. *Il modello virtuale per il progetto: lo studio del «progetto ophelia»*. In: Moro Alonso Munoyerro S., Rueda Màrquez de la Plata A., Aleyandro Cruz Franco P. (a cura di), *Criterio y método en época de crisis Ingeniería y técnica al servicio de la restauración*. Atti del Congreso Internacional sobre documentación, conservación i reutilización del patrimonio arquitectónico. Madrid, 20-22 giugno 2013, MADRID: c2o Servicios Editoriales, 2013. pp. 301-307. ISBN: 978-84-15321-73-6.
- [6] BOFFITO, Maura. *Il rilievo del tempo – percorso di un lavoro rigoroso tra archivi e biblioteche*. Genova: Sagep spa, 1990.
- [7] CAPORALE, Giuseppe. *G. Quaroni - M. Piacentini: concorso per la costruzione del manicomio provinciale di Potenza*. Potenza: Il Salice, 1997.
- [8] CARDONE, Vito. *Modelli grafici dell'architettura e del territorio*. Salerno: Edizioni CUES, 2008. ISBN 978-88-95028-20-0.
- [9] CONTE, Antonio (a cura di). *Borghi Rurali e Nuclei Urbani di Fondazione. Disegno, rilievo e documentazione dei sistemi architettonici del primo Novecento in Basilicata*. Potenza: Edizioni Ermes, 2008.
- [10] DE FELICE, Giuliano, SIBILANO, Maria Giuseppina, VOLPE Giuliano (a cura di). *L'informatica e il metodo della stratigrafia*. Atti del Workshop (Foggia 6-7 giugno 2008). Bari: Edipuglia, 2008. ISBN 978-88-7228-551-0.
- [11] FIORILLO, Fausta, FERNÁNDEZ-PALACIOS, Belen Jiménez, REMONDINO, Fabio, BARBA, Salvatore. 3D surveying and modelling of the archaeological area of Paestum, Italy. In *VAR*, 2013, vol. 4 n. 8, pp. 55-60. ISSN: 1989-9947.
- [12] GIUFFRÉ, Antonio. *Sicurezza e conservazione dei centri storici*. Roma-Bari: Editori Laterza, 2006.
- [13] GUIDI, Gabriele, RUSSO Michele, BERALDIN Jean-Angelo. *Acquisizione 3D e modellazione poligonale*. Milano: McGraw-Hill, 2010. ISBN 978-88-386-6531-8.
- [14] MUSSO, Stefano. *Recupero e restauro degli edifici storici. Guida pratica al rilievo e alla diagnostica*. Roma: EPC Libri, 2004.
- [15] ORTIZ CODER, Pedro, BARBA, Salvatore, FIORILLO, Fausta, PUGLIESE, Francesco. *Archaeological plan restitution with cloud computing*. In REMONDINO, Fabio. *LOW-COST 3D: sensori, algoritmi e applicazioni*. Trento, 2012.
- [16] REMONDINO, Fabio, EL-HAKIM Sabry. *Image-based 3D modeling: a review*. In *Photogrammetric Record*. 2006, vol. 21, Issue 114, pp. 269-291.
- [17] REMONDINO, Fabio. *Rilievo e modellazione 3D di siti e architetture complesse*. In *Disegnare-Con*, 2011, vol. 4 n. 8, pp.90-98. ISSN: 1828-5961.
- [18] RUSSO, Michele, REMONDINO, Fabio. *Laser scanning e fotogrammetria: strumenti e metodi di rilievo tridimensionale per l'archeologia*. In BROGILOLO, Gian Pietro, ANGELUCCI, Diego, COLECHIA, Annalisa, REMONDINO, Fabio (a cura di). *Teoria e metodi della ricerca sul paesaggio d'altura*. Quingentole (Mantova): SAP, 2012, pp. 133-164. ISBN 978-88-87115.
- [19] SACCONI, Tommaso, MARGHERITA, Cristiana. *Nuove tecnologie informatiche applicate all'archeologia. Documentare l'archeologia con i sistemi informativi geografici*. Minerva associazione culturale, 2015, p. 7.