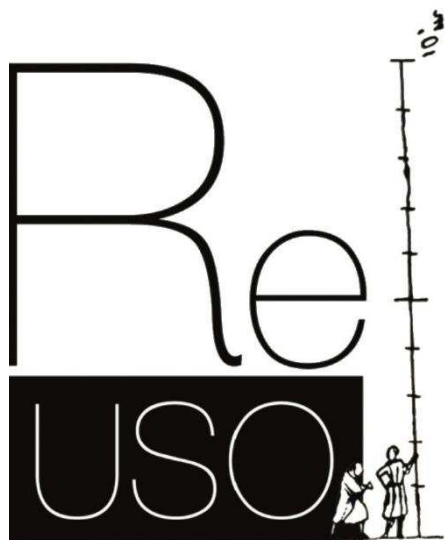


## Documentation, Restoration and Reuse of Heritage

2-4 November 2022  
Porto, Portugal

# BOOK OF EXTENDED ABSTRACTS





Documentation, Restoration  
and Reuse of Heritage

## Book of Extended Abstracts

2-4 November 2022  
Porto, Portugal

[www.fe.up.pt/reuso](http://www.fe.up.pt/reuso)

Extended Abstracts of the  
**X<sup>th</sup> edition of the ReUSO - Documentation, Restoration and Reuse of Heritage**

Format: Ebook (pdf)

ISBN: 978-972-752-297-2

Porto, Portugal, 2-4 November 2022

H. Varum, A. Furtado & J. Melo (eds.)

The Conference Organizing Committee are not responsible for the statements of opinions expressed in this publication. Any statements of views expressed in the extended abstracts contained in this Book are those of the author(s). Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

## Chair

Humberto Varum  
U.Porto / FEUP, Conference Chair

## Honorary Committee

António Sousa Pereira (Rector) | UP | Portugal  
Rui Artur Bártolo Calçada (Director) | FEUP | Portugal  
João Pedro Xavier (Director) | FAUP | Portugal  
Ignazio Marcello Mancini (Dean) | U. Basilicata | Italy  
Giuseppe De Luca (Director) | U. Firenze | Italy  
Aldo Corcella (Director) | DiCEM/U. Basilicata | Italy  
Susanna Caccia Gherardini (Professor) | U. Firenze | Italy

## ReUSO Founding Committee

Stefano Bertocci | U. Firenze | Italy  
Giovanni Minutoli | U. Firenze | Italy  
Fauzia Farneti | U. Firenze | Italy  
Susana Mora | U.P. Madrid | Spain  
Silvio Van Riel | U. Firenze | Italy

## Organising Committee

Humberto Varum, Portugal  
Alexandre Costa, Portugal  
André Furtado, Portugal  
Aníbal Costa, Portugal  
António Arêde, Portugal  
Bruno Marques, Portugal  
Bruno Quelhas, Portugal  
Cilísia Ornelas, Portugal  
Clara Vale, Portugal  
Esmeralda Paupério, Portugal  
Hipólito Sousa, Portugal  
Hugo Rodrigues, Portugal  
João Miranda Guedes, Portugal

José Melo, Portugal  
José Miguel Rodrigues, Portugal  
Marco Faggella, Italy  
Miguel Malheiro, Portugal  
Nelson Vila Pouca, Portugal  
Patrício Rocha, Portugal  
Pedro Delgado, Portugal  
Rui Póvoas, Portugal  
Rui Silva, Portugal  
Teresa Ferreira, Portugal  
Vasco Freitas, Portugal  
Xavier Romão, Portugal

## Scientific Committee

Humberto Varum, Portugal  
Agostino Catalano, Italy  
Alexandre Costa, Portugal  
Alice Tavares, Portugal  
Ana Tostões, Portugal  
Ana Velosa, Portugal  
André Furtado, Portugal  
Andrea Nanetti, Singapore  
Angelo Lucchini, Italy  
Aníbal Costa, Portugal  
Antonella Guida, Italy  
Antonello Pagliuca, Italy  
Antoni Moreno-Navarro, Spain  
António Arêde, Portugal  
Antonio Conte, Italy  
Calogero Bellanca, Italy  
Camilla Mileto, Spain  
Caterina Palestini, Italy  
Clara Vale, Portugal  
Damiano Lacobone, Italy

Juan A. García Esparza, Spain  
Juan B. Aznar Mollá, Spain  
Lorenzo Jurina, Italy  
Luis Miguel Correia, Portugal  
Luis Palmero Iglesias, Spain  
Manlio Montuori, Italy  
Manuela Grecchi, Italy  
Marcello Balzani, Italy  
Marco D'Orazio, Italy  
Marco Faggella, Italy  
Marco Morandotti, Italy  
Marco Pretelli, Italy  
Marco Tanganelli, Italy  
Marcos Tognon, Brazil  
Maria Fernandes, Portugal  
María Paz Sáez Pérez, Spain  
Mariana Correia, Portugal  
Marianna Calia, Italy  
Mariella De Fino, Italy  
Marina Fumo, Italy

Daniel Oliveira, Portugal	Mario Bevilacqua, Italy
Daniela Concas, Italy	Michele D'Amato, Italy
Daniela Esposito, Italy	Miguel Malheiro, Portugal
Edoardo Curra, Italy	Nadia Ieksarova, Ukraine
Eduardo Júlio, Portugal	Nelson Vila Pouca, Portugal
Elena Cantatore, Italy	Nicola Masini, Italy
Emanuela Chiavoni, Italy	Nicola Santopuoli, Italy
Emanuele Romeo, Italy	Nicola Tarque, Peru
Enrico Sergio Mazzucchelli, Italy	Nina Avramidou, Italy
Enrico Sicignano, Italy	Nuno Valentim, Portugal
Enrico Spacone, Italy	Panagiotis Asteris, Greece
Esmeralda Paupério, Portugal	Patrício Rocha, Portugal
Fabio Fatiguso, Italy	Paulo Cruz, Portugal
Fauzia Farneti, Italy	Paulo Lourenço, Portugal
Fernando Branco, Portugal	Pedro Castro Borges, México
Fernando Pinho, Portugal	Raffaella Lione, Italy
Fernando Vegas, Spain	Raimundo Mendes da Silva, Portugal
Francesca Fatta, Italy	Renata Prescia, Italy
Gianluca Belli, Italy	Reynaldo Esperanza Castro, Mexico
Gianni Minutoli, Italy	Riccardo Gulli, Italy
Giorgio Monti, Italy	Rita Bento, Portugal
Giovanni Pancani, Italy	Roberta Maria Dal Mas, Italy
Giovanni Santi, Italy	Roberta Spallone, Italy
Giuseppe Margani, Italy	Roberto Castelluccio, Italy
Graziella Bernardo, Italy	Romeu Vicente, Portugal
Guido Camata, Italy	Rosa Maria Caballero, Spain
Hipólito Sousa, Portugal	Rosário Veiga, Portugal
Hugo Rodrigues, Portugal	Rui Póvoas, Portugal
Ignacio Lombillo, Spain	Sandro Parrinello, Italy
Inês Flores-Cólen, Portugal	Sérgio Lagomarsino, Italy
Ippolita Mecca, Italy	Sibel Onat Hattap, Turkey
Javier Mosteiro, Spain	Silvio Van Riel, Italy
João Appleton, Portugal	Soraya Genin, Portugal
João Lanzinha, Portugal	Stefano Bertocci, Italy
João Mascarenhas Mateus, Portugal	Susana Alonso-Muñoyerro, Spain
João Miranda Guedes, Portugal	Tayyibi Abdelghani, Morocco
Joaquim Teixeira, Portugal	Teresa Ferreira, Portugal
Jolanta Sroczynska, Poland	Tiago Ferreira, Portugal
Jorge Branco, Portugal	Tiago Pinto, Portugal
Jorge Pinto, Portugal	Vanessa Borges Brasileiro, Brazil
José Aguiar, Portugal	Vasco Freitas, Portugal
José Melo, Portugal	Veronica Vitiello, Italy
José Miguel Rodrigues, Portugal	Vito Domenico Porcari, Italy
José Ramon Albiol Ibanez, Spain	Xavier Romão, Portugal

## CONTENTS

### Plenary Keynote Lectures

Methodology for minimum intervention in sustainable Earthen architecture .....	1
<i>Aníbal Costa, Alice Tavares</i>	
Gran Canaria: patrimonio diverso .....	9
<i>Juan Sebastián López García</i>	
The rehabilitation of Bolhão Market, Porto. Project, process and the future of historical central markets .....	11
<i>Nuno Valentim</i>	

### Participants communications

Process to optimize the life cycle of used timber elements. ....	13
<i>Stefania De Gregorio</i>	
The New Towns of Sierra Morena .....	15
<i>Emma Mora-Figueroa and José Luis Almansa</i>	
The Monastery of Sant Miquel d'Escornalbou (Tarragona, Spain): multidisciplinary research for the understanding of the relation between the religious complex, the territory and the European Franciscan network. ....	17
<i>Soler Maria, Ferretti Roberta and Cioli Federico</i>	
The abandoned mining complexes in Sardinia. Potential approaches to recover their value .....	19
<i>Dessì Maria</i>	
Problems of Intervention in Non-Monumental Architectures in Brazilian Historic Centers: a case study of the Tiradentes Town Hall. ....	21
<i>André Dangelo, Vanessa Brasileiro, Valéria França, David Machado and Luiza S. Araújo</i>	
The musealization of modern residential architecture .....	23
<i>Casale Teresa and Garda Emilia</i>	
Evaluating the impact of infrastructures on urban ecosystems: application of the Envision Protocol to the “Sopraelevata” of Genoa .....	25
<i>Vite Clara and Gaggero Marta</i>	
Valorisation and Reuse of Catholic Heritage in the Balkan Peninsula .....	27
<i>Trematerra Adriana, Gennaro Pio Lento and Luigi Corniello</i>	
The Palladian villas: landscape and architecture. Protection of an environmental system .....	29
<i>Giovanni Minutoli</i>	
Recovery and reuse in the walkway architecture: looking to the future for dismissed rural buildings in Italy and France .....	31
<i>Garda Emilia and Renzulli Alessandra</i>	
Natural hydraulic mortars for rehabilitation of historic buildings: review of the state of the art .....	33
<i>Fernanda Calado Mendonça and Lino Maia</i>	
Place and identity. Conceiving the Genius Loci .....	35
<i>Di Mari Giuliana, Garda Emilia Maria, Renzulli Alessandra and Vitale Denise</i>	
The Garden of Remembrance on the ruins of the Marburg synagogue in Germany: memory, identity and reuse .....	37
<i>Rossella Leone, Roberto Ragione and Nicola Santopuoli</i>	
Maintaining and reusing in tourism accommodation construction in Baixo Tâmega Valley .....	39
<i>Jorge Pinto, Isabel Bentes, Cristina Reis, Paula Luísa, Sandra Pereira, Zięba Zofia and Anabela Paiva</i>	

Survey of the Leiria Castle Tower.....	41
<i>Carina Carmo, Ana Silva, Tamiris Dourado, Francisca Antunes, Francisca Pinto, Fábio Mota, Catarina Freitas, David Pereira, Vitor Antunes, Dener Silva, Inês Bourgeois, Ana Alves and Hugo Rodrigues</i>	
Understanding, interpreting, and shaping a dialogue between drawing and digital modelling. The case study of Donatello's Pulpit .....	43
<i>Sandro Parrinello, Francesca Picchio and Silvia La Placa</i>	
Earth-based mortars at the Wupatki Pueblo: a preliminary assessment through non-destructive testing .....	45
<i>Laura Gambilongo, Alberto Barontini and Paulo Lourenço</i>	
WoodBox modules: a flexible and re-usable emergency solution for temporary retail activities .....	47
<i>Lucchini Angelo, Mazzucchelli Enrico Sergio, Scrinzi Giacomo, Pastori Sofia, Stefanazzi Alberto, Silva Stefania and Severgnini Mario</i>	
The factory and its doom. Considerations about the non-application of the different knowledge for the restoration and use of industrial heritage in the case of Olivetti Brasil.....	49
<i>Di Mari Giuliana and Garda Emilia</i>	
The Rehabilitation Impact of Historic Houses on Cultural Heritage Sustainable Actions for the Historic Centre of Oporto, World Heritage Site.....	51
<i>Inês Rosa, Patrícia Moreira, João Miranda Guedes and Eduarda Vieira</i>	
Shen Joan Vladimirit Orthodox Monastery: reuse and conservation .....	53
<i>Trematerra Adriana</i>	
The Fort of SS. Salvatore in Messina. Relief, stratifications and degradation of a fortification between the Middle Ages and the Modern Age.....	55
<i>Alessio Altadonna, Giuseppe Martello, Antonino Nastasi and Fabio Todesco</i>	
Strategies for rural settlements and marginal areas regeneration: multiscale and multidisciplinary approach for a systemic process .....	57
<i>Fernanda Speciale, Manuela Grecchi and Laura Elisabetta Malighetti</i>	
Spaces, society, university: for a renewed teaching of restoration. The case study of Amideria Chiozza .....	59
<i>Alessandra Marin and Sergio Pratali Maffei</i>	
Improving Cultural Heritage conservation: LSTM neural networks to effectively processing end-user's maintenance requests.....	63
<i>Marco D'Orazio, Gabriele Bernardini and Elisa Di Giuseppe</i>	
CityGML-based models for the qualification of cultural built environment: the 3D Semantical City Model of the historic district of Carovigno (BR), Italy.....	65
<i>Margherita Lasorella, Elena Cantatore and Fabio Fatiguso</i>	
Recupero del campanile a vela della Chiesa di San Domenico a Bari .....	67
<i>Serra Alessandro de Marco Marina</i>	
Veiled Head. Restoration and extension of the town hall of Capo d'Orlando .....	69
<i>Pier Paolo Lagani</i>	
Towards zero plastic waste: reuse and recycling of PolyEthylene Terephthalate (PET) sand .....	71
<i>Beibei Xiong, Cristoforo Demartino, Devid Falliano and Giuseppe Carlo Marano</i>	
Bloco da Carvalhosa, The South Terraces Reinterpretation.....	73
<i>Henrique Ferreira, Carlos Maia and Paulo Mendonça</i>	
Adaptive reuse as a strategy for overcoming obsolescence: the "Mercato dei Fiori" in Pescia.....	75
<i>Maurizio De Vita, Laura Marchionne and Elisa Parrini</i>	
The recognition of cultural value as an element of the recovery project for the XX Century Heritage. Application of the ICOMOS Methodology to the ex S.M.O.M. of Pozzuoli .....	77
<i>Veronica Vitiello, Roberto Castelluccio and Silvia Trampetti</i>	
A methodology for the comfort upgrading and the microclimate management: a case study.....	79
<i>Mariangela De Vita, Chiara Marchionni, Marianna Rotilio, Giovanna Di Cresce and Pierluigi De Berardinis</i>	

Methodological proposal for the analysis of the heritage values of buildings for intervention decisions .....	81
<i>Fatima Benchenni and Juan Monjo-Carrió</i>	
Healthcare setting enhancements for Covid-19 emergency: sustainability and seismic management .....	83
<i>Chiara Marchionni, Martina Sciomenta, Giulio D’Alessandro, Francesco Carozza and Massimo Fragiaco</i>	
Circular approach for deep renovation of historic building heritage. The case of a manor villa in Argelato, Bologna .....	85
<i>Cecilia Mazzoli, Lorna Dragonetti, Rachele Corticelli and Annarita Ferrante</i>	
The use and the conservation of historic buildings. Case studies in the Alentejo region, Portugal.....	87
<i>Maria Fernandes and Maria João Costa</i>	
Place and identity. Conceiving the <i>Genius Loci</i> .....	89
<i>Giuliana Di Mari, Emilia Maria Garda, Alessandra Renzulli and Denise Vitale</i>	
The Preservation of Built Heritage Typical Characteristics in through the Codes of Practice. An Operational Tool for the Renovation of San Giovanni Lipioni’s Heritage .....	91
<i>Carlo Constantino, Anna Chiara Benedetti, Nicola Mantini, Cristiana Bartolomei and Giorgia Predari</i>	
Influence of calcium chloride on the properties of lime pastes with pozzolanic additions. ....	93
<i>Leane Priscilla Bonfim Sales and Aline Figueiredo da Nóbrega</i>	
The building of the Gioventù Italiana del Littorio in Forlì converts into a Museum of Gymnastics and an Auditorium. Restoration and reuse of dissonant architecture .....	95
<i>Andrea Savorelli and Chiara Atanasi Brilli</i>	
Historical rural architecture of North Portugal and Spanish Galicia – analysis of vernacular forms and concept of adaptation for cultural tourism needs, case study of Porreiras in Portugal.....	97
<i>Marta Orszt and Elżbieta Raszeja</i>	
Glocalization design strategies of multinational enterprises in the context of revitalizing historic districts: Case studies in China and Europe .....	99
<i>Xi Wei, Xin Wu, Qiang Xu, Jiajun Li and Marianna Calia</i>	
Indoor air quality and ventilation: two fundamentals to define Healthy Buildings.....	101
<i>Maria Sofia Savoca Ludovica</i>	
Projection mapping for the enhancement of Estense wall paintings: a workflow for complex surfaces and the management of colors.....	103
<i>Manuela Incerti and Stefano Giannetti</i>	
Integrated investigation methodologies for architectural Heritage conservation and promotion: La Romita di Cesi (TR), Umbria, Italy.....	105
<i>Anastasia Cottini and Pietro Becherini</i>	
Bridging tradition and modernism in the reuse of built heritage. Fernando Távora’s design approach at the Porto University Club .....	107
<i>David Ordoñez-Castañon and Teresa Cunha Ferreira</i>	
Review on the application of ceramic residues in mortars .....	109
<i>Fernanda Calado Mendonça and Lino Maia</i>	
The reuse of the architectural heritage in a state of ruin as a strategy for the conservation. The “Canto di Stampace” in Pisa .....	111
<i>Laura Marchionne and Elisa Parrini</i>	
Start over from the fragment. Some notes on old Gibellina and new Gibellina. ....	113
<i>Daniela Esposito and Daniela Concas</i>	
The energy requalification of an author's social housing complex Ridolfi’s INCIS houses: a challenge for heat-reflective coatings.....	115
<i>Giuseppina Currò, Ornella Fiandaca and Giovanni F. Russo</i>	
Waterfront Renaissance in Bagnoli (Italy). ....	117
<i>Angelica Rocco and Dora Francese</i>	



Sustainability in historic centres. Analysis of different variables of the built environment .....	119
<i>Cristina Buenaño, Juan A. García-Esparza and Pablo Altaba</i>	
The reuse of Lisbon convent typologies into collective housing.....	121
<i>José Miguel Silva</i>	
Technical analysis of the use of the waste from ornamental rock in coating mortar.....	125
<i>Ivna Alves de Lima, Helaine Silva Nascimento, Perboyre Barbosa Alcântara</i>	
Ancient Monastery of S. Spirito in Bergamo: the rebirth.....	127
<i>Beatrice Bolandrini, Roberta Grazioli and Simone Tribbia</i>	
Fragility and recovery of colonial architecture: toward sustainable rehabilitation in Morocco .....	131
<i>Giovanni Santi and Majda Abida</i>	
The value of use and scheduled maintenance of historical buildings with architectural interest: the case study of the Quaglietta Castle in Campania (Italy). .....	133
<i>Eliana Basile and Gigliola D'Angelo</i>	
The reuse and reliving of space in architectural heritage. Proposal for intervention in Tabacalera, Valencia .....	135
<i>Graziella Bernardo and Luis Manuel Palmero Iglesias</i>	
Intervention Methodology in the Porto Burgeoise House – The conservation of heritage values is an environmentally sustainable action .....	137
<i>Joaquim Teixeira and Rui Fernandes Póvoas</i>	
The cloister of Santa Marta in Bergamo: from the restoration by Luigi Angelini to the current context of the new Piacentiniano Centre.....	139
<i>Antonella Versaci and Alessio Cardaci</i>	
Adaptive reuse of built heritage in Portugal: Alcino Cardoso House (1971-1991) by Álvaro Siza as a reference case study .....	141
<i>Teresa Cunha Ferreira, Eleonora Fanitini, David Ordoñez-Castañon, Miguel Coutinho and Tiago Cruz</i>	
The Rehabilitation Impact of Historic Houses on Cultural Heritage Sustainable Actions for the Historic Centre of Oporto, World Heritage Site.....	143
<i>Inês Rosa, Patrícia R. Moreira, João Miranda Guedes and Eduarda Vieira</i>	
Sustainable assessment for ancient timber structures with multi criteria decision analysis: the Cloister of Michelangelo in the Diocletian Baths .....	145
<i>Silvia Santini, Vittoria Borghese and Carlo Baggio</i>	
Presentation of a methodology for the analysis of old industrial chimneys .....	147
<i>Rui Silva, Nelson Vila Pouca, Patrício Rocha, Paupério Esmeralda and António Arêde</i>	
Understanding to maintain the INA-CASA experimentation. Minnucci and public housing in Brindisi.....	149
<i>Carla Chiarantoni</i>	
Fortresses in Portugal. Conservation and basis for new uses .....	151
<i>Esmeralda Paupério, António Arêde and Rui Silva</i>	
Raw earth and 'circular' application methodologies 4.0 .....	153
<i>Giulio Pacente, Antonella Guida, Graziella Bernardo and Luis Manuel Palmero Iglesias</i>	
H-BET Historic Built Environment Typologies. Open spaces and SUOD events in the compact historic town .....	155
<i>Edoardo Currà, Alessandro D'Amico, Martina Russo, Marco Angelosanti, Enrico Quagliarini and Cassia De Lian Cui</i>	
The reuse of an aristocratic palace in inland Cilento (Salerno, Italy).....	159
<i>Francesco Polverino and Claudia Sicignano</i>	
Hypothesis of “Dogana” recovery at the Magdalena Bridge.....	161
<i>Renato Iovino, Ippolita Mecca, Emanuele La Mantia and Flavia Fascia</i>	
Garden as Architectural Heritage of the Bastion Castle Ensemble .....	163
<i>Olha Tikhonova</i>	

Recovering the modern. A “fragile” work of Ignazio Gardella.....	165
<i>Annalisa Dameri and Paolo Mellano</i>	
The difficult “reuse” of historical heritage: the case of the Scardavilla di Sopra Monastery in Meldola.....	167
<i>Fauzia Farneti and Silvio Van Riel</i>	
Traditional Dwellings as Wildlife Habitat – Baixo Tâmega Valley Case.....	169
<i>Jorge Pinto, Isabel Bentes, Zofia Zięba, Cristina Reis and Sandra Pereira</i>	
The palace of the Forest and Grove of Heras: intervention of Manuel del Olmo in a property of the duke of Infantado.....	171
<i>Carlos González Duque</i>	
Pro-mobility: analysis, study and research of the most inaccessible archaeological heritage.....	173
<i>Adela Rueda Márquez de la Plata, Pablo A. Cruz Franco and Jorge A. Ramos Sánchez</i>	
Polychrome majolica of Apulian domes: history, technique, pathology and conservation.....	175
<i>Mariella de Fino, Vito Domenico Porcari, Albina Sciotti, Stefano Sica, Antonella Guida and Fabio Fatiguso</i>	
Regeneration and salutogenic design and regeneration for building heritage.....	177
<i>Rosa Maria Vitrano</i>	
The role of landscape study in Architecture Degree courses.....	179
<i>Cecilia Sodano and Nicola Santopuoli</i>	
A teaching experience in cooperation between University and Municipality for the reuse of an architectural complex in Northern Italy.....	181
<i>Eva Coïsson, Chiara Vernizzi and Elena Zanazzi</i>	
Traditional Materials in Higher Education.....	183
<i>Ana Velosa</i>	
The Sacro Monte and the Convent of San Vivaldo in Montaione (FI).....	187
<i>Giovanni Pancani and Lorenzo Matteoli</i>	
Architectural heritage: intervention to continue.....	189
<i>Miguel Malheiro</i>	
Villages and regeneration.....	191
<i>Claudia Battaino and Maria Paola Gatti</i>	
Diagnostics archive data for the analysis of the Architectural Heritage’s conservation state.....	193
<i>Laura Morero, Francesca Visone, Vito Domenico Porcari, Guida Antonella and Massini Nicola</i>	
Identity of Apulia’s wine heritage. Knowledge and valorisation of the F.lli Folonari wine establishment in Squinzano (LE).....	195
<i>Antonella Guida, Graziella Bernardo, Antonio Monte, Alessandro Lanzolla and Alexia Giannone</i>	
Documentation, conservation, and reuse planning activities for disused cultural heritage.....	197
<i>Marco Morandotti and Elisabetta Doria</i>	
Behavioural decision-making in sustainable conservation of built heritage.....	199
<i>Joana Gonçalves, Ricardo Mateus, José Silvestre and Ana Pereira Roders</i>	
Microclimatic monitoring as basis of a project process: an experimentation in Rome.....	201
<i>Gaia Turchetti</i>	
Around roman square: digital documentation and communication.....	205
<i>Martina Attenni, Vittoria Castiglione, Alfonso Ippolito, Mahsa Noursati Kordkandi and Simone Helena Tanoue Vizioli</i>	
The reuse of S. Domenico Church in L’Aquila; adaptive strategies for the design of a new congress hall.....	207
<i>Alessandra Bellicoso, Pierluigi De Berardinis, Mariangela De Vita, Danilo Di Donato, Gianni Di Giovanni, Tullio de Rubeis, Marianna Rotilio and Alessandra Tosone</i>	
Sustainable reuse of vernacular architecture for rural tourism development.....	209
<i>Albina Sciotti, Mariella De Fino and Fabio Fatiguso</i>	

The training of the conservator-restorer in the School of Arts of the Universidade Católica Portuguesa (Porto-Portugal). The challenges of 21st century towards sustainable conservation.....	211
<i>Eduarda Vieira and Patrícia Moreira</i>	
The theoretical foundation of architectural restoration.....	213
<i>Cesare Crova</i>	
Architectural Restoration between Research and Project: results of the first decade of experience in the Building Engineering-Architecture Course (2012-2022).....	215
<i>Nicoletta Marconi and Valentina Florio</i>	
Teaching Architectural Conservation Design: a resilient experience during COVID-19 pandemic in Brazil .....	219
<i>Pedro Murilo Gonçalves de Freitas</i>	
Behavioural-design-based risk assessment and mitigation against floods in historical urban built environment: a virtual reality approach.....	221
<i>Gabriele Bernardini, Alessandro D'Amico, Enrico Quagliarini and Ruggiero Lovreglio</i>	
Toward quick multi-risk mitigation in historic Public Open Spaces: a behavioral-design approach in typological scenarios for heatwaves and terrorist acts .....	223
<i>Gabriele Bernardini, Enrico Quagliarini and Marco D'Orazio</i>	
Implementing open-source information systems for assessing and managing the seismic vulnerability of historical constructions.....	225
<i>Rafael Ramírez Eudave, Daniel Rodrigues, Tiago Ferreira and Romeu Vicente</i>	
Probabilistic analysis of the corrosion hazard at territorial scale for supporting the preservation of concrete structures in coastal areas.....	227
<i>Giuseppe Quaranta, Gian Felice Giaccu, Bruno Briseghella and Camillo Nuti</i>	
Spontaneous rural settlements in the Emilia 2012 seismic aftermath: strategies for the enhancement of the countryside landscape.....	229
<i>Montuori Manlio</i>	
Diagnostic campaigns and structural assessment of an existing masonry buildings .....	231
<i>Riccardo Mario Azzara, Vieri Cardinali, Maria Teresa Cristofaro and Marco Tanganelli</i>	
Compression behaviour of heavily damaged concrete specimens confined with FRP.....	233
<i>Alfonso Cobo Escamilla, María Isabel Prieto Barrio, Alicia Zaragoza Benzal and Daniel Ferrández Vega</i>	
Use of stainless-steel corrugated bar as reinforcements in new and heritage concrete structures that require enhanced durability .....	235
<i>Asunción Bautista and Francisco Velasco</i>	
Extreme wind events and risk mitigation: overview and perspectives for resilient building envelopes design in the Italian context.....	237
<i>Enrico S. Mazzucchelli, Giacomo Scrinzi, Sofia Pastori, Paolo Rigone, Angelo Lucchini, Dario Trabucco and Martino Milardi</i>	
Effect of corrosion on the mechanical behaviour of reinforcement in concrete structures.....	239
<i>Alfonso Cobo Escamilla, María Isabel Prieto Barrio, Alicia Zaragoza Benzal and Daniel Ferrández Vega</i>	
Traditional stone masonry walls subjected to blast and axial loadings .....	241
<i>J. F. M. Conceição, Fernando Pinho and Joaquim B.</i>	
Evaluation of the seismic vulnerability of Coimbra's old city center: A comparative study between 2009-2021 .....	243
<i>Marcos Antonio Chiamulera, Tiago Ferreira, Romeu Vicente and J. Mendes da Silva</i>	
Optimal reinforcement of existing masonry and reinforced concrete structures using evolutionary algorithms.....	245
<i>Fabio Di Trapani, Antonio Pio Sberna, Cristoforo Demartino and Giuseppe Carlo Marano</i>	
Methodology for Assessing the Degradation Level of Existing Structures with a Parameterized Cubic Damage Model .....	247
<i>Erik Dutra and João Pantoja</i>	

SHM for failure propagation detection in steel truss bridges .....	249
<i>Manuel Buitrago, Giacomo Caredda, Elisa Bertolesi, Cristina Porcu, Pedro Calderón and José Adam</i>	
Seismic vulnerability assessment of a Medieval urban cluster identified as a complex Historical Palace: Palagio di Parte Guelfa in Florence .....	251
<i>Vieri Cardinali, Anna Caranti, Anna Livia Ciuffreda, Massimo Coli, Mario De Stefano and Marco Tanganelli</i>	
Three in one. A step towards a rehabilitation 4.0 .....	253
<i>Isabel Bentes, Jorge Pinto, Sandra Pereira, Carla Teixeira and Anabela Paiva</i>	
Reflections on the mismatch between historic preservation and risk management policies in Brazil: case study of the municipality of Cachoeira, Bahia .....	257
<i>Alexandra Cruz Passuello, Eloisa Maria Adami Giazzon, Vanessa Gomes Gonçalves, Bruna Souza Rosa and Maria da Graça Andrade Dias</i>	
The Assessment of Urban Identity: A Methodological Approach.....	259
<i>Alexandra Calheiros, Joana Correia, Íris Gouveia and Inês Lopes</i>	
Catastrophic Destruction of the Cultural Heritage of Odessa, XX-XXI c.c. ....	261
<i>Nadiia Yeksarova, Vladimir Yeksarov and Andrii Yeksarov</i>	
Sarajevo military brownfields. Principles for adaptive reuse .....	263
<i>Salihbegović Amra and Chizzoniti Domenico</i>	
Mosul's cultural and social heritage reconstruction after ISIS war.....	267
<i>Laura Nicolini</i>	
Architectural heritage and armed conflicts. The bombing of Potenza in Basilicata in 1943 .....	269
<i>Enza Tolla and Giuseppe Damone</i>	
War, yesterday and today. Documentation of the destruction of and damage to historic-monumental buildings through testimony and recounting by the mass media.....	271
<i>Maria Giovanna Putzu, and Fabrizio Oddi</i>	
The Fairground of Lebanon in Tripoli between pre-war and post-war period. Events, Meanings and Future .....	273
<i>Francesca Albani and Joe Zaatar</i>	
The DALIH database for recording disaster damage and loss data for cultural heritage .....	275
<i>Xavier Romão, Esmeralda Paupério and Olha Tikhonova</i>	
The renovation of the urban space of the industrial areas discontinued after the second world war. The case of the Costantino cotton factory in Bari.....	277
<i>Carla Chiarantoni</i>	
Workflow for virtualisation of historic gardens and their vegetation. The historic garden of la Arguijuela de arriba (Cáceres, España) .....	279
<i>Carlos Rodríguez Sánchez, Pablo Alejandro Cruz Franco and Elena Gómez Bernal</i>	
Some remarks on the interoperability performance of HBIM models for structural conservation and upgrading of building aggregates in the Italian minor centres.....	281
<i>Adriana Marra, Giovanni Fabbrocini and Ilaria Trizio</i>	
Pantalica Rupestre: digital survey for the image of rock-cut Architecture .....	283
<i>Carlo Inglese, Roberto Barni and Marika Griffo</i>	
Assessing the quality of Terrestrial Laser Scanning and Mobile Laser Scanning for a preliminary approach to a study on laser scanning of historic gardens .....	285
<i>Caroline Machado and Graziella Del Duca</i>	
Computational 3D modeling supporting the preservation of historic timber roofs: the case of San Pietro's Cathedral in Bologna .....	287
<i>Angelo Massafra, Davide Prati, and Giorgia Predari</i>	
On surfaces over time: assessment of degradation and monitoring of the effectiveness of consolidation and protective treatments .....	289
<i>Graziella Bernardo, Antonella Guida and Francesca Visone</i>	

Decay detection in historic buildings through image-based deep learning .....	291
<i>Bruno Silvana, Rosella Alessia Galantucci and Antonella Mussico</i>	
Methodology for the generation of 3D city models and integration of HBIM models in GIS: Case studies .....	293
<i>César A. Carrasco, Ignacio Lombillo and Javier M. Sánchez-Espeso</i>	
Implementation of a structural health monitoring using optic fiber sensors in the Monastery of Batalha .....	295
<i>Inês Bourgeois, Luís Pereira, Paulo Antunes, Carlos Marques, Victor Ferreira and Hugo Rodrigues</i>	
Physical prototyping of digital twins for the documentation, protection and dissemination of Heritage .....	297
<i>María Pérez Sendín, Pablo Alejandro Cruz Franco and Antonio Gordillo Guerrero</i>	
Integration of 3D modelling with photogrammetry applied on historical images for cultural heritage.....	299
<i>Francesca Condorelli and Sara Morena</i>	
LabSAMPA – Laboratory for documentation of historical architecture in São Paulo: An experience of didactic cooperation between the Faculdade de Arquitetura e Urbanismo da Universidade de São Paulo and the Dipartimento di Architettura dell’Università degli Studi di Firenze, using Laser Scanner 3 D technology and photogrammetry.....	301
<i>Stefano Bertocci, Regina Helena Vieira Santos, Luciano Migliaccio and Beatriz Piccolotto Bueno</i>	
Scan-to-BIM applied to heritage conservation: a case study of Aldeia do Fajaco .....	303
<i>Gabriel Sugiyama, Hugo Rodrigues and Fernanda Rodrigues</i>	
3D digitalisation techniques for the HBIM modelling of an existing building. Application to the inventory of defects and the management of the maintenance of a facade .....	305
<i>César A. Carrasco, Javier M. Sánchez-Espeso and Ignacio Lombillo</i>	
Photogrammetry and 3D printing for conservation and disclosure of Cultural Heritage .....	307
<i>Sara Gonizzi Barsanti and Adriana Rossi</i>	
New life for on-site concrete demolition for a recovery project in Tres Cantos, Madrid: from residue to green finishing.....	309
<i>Giuseppe Trinchesi, Alessia Verniero and García López de la Osa Gregorio</i>	
Monitoring the thermal comfort of a multifamily housing building from the Modern Movement period .....	311
<i>Ivo Silva, Carlos Maia and Paulo Mendonça</i>	
Remote Sensing and architectural survey for the restoration of Al Raabiya mosque, Mosul (Iraq).....	313
<i>Stefano Bertocci, Matteo Bigongiari and Pietro Becherini</i>	
Material re-use in 3D printed building components .....	315
<i>Stelladrianna Volpe, Sangiorgio Valentino, Andrea Petrella, Michele Notarnicola, Humberto Varum and Fiorito Francesco</i>	
Integrated approach based on UAV and NDT for assessment of Roman Concrete Groin Vaults .....	317
<i>Silvia Santini, Carlo Baggio, Valerio Sabbatini and Claudio Sebastiani</i>	
Implementation of a wireless structural monitoring system and reverse engineering for numerical analysis purposes of a 16th century church .....	319
<i>António Arêde, Susana Moreira, Gabriel Ferreira, Clara Vale, Hugo Pires, Luís Garcia and Orlando SousaSilvia Santini, Carlo Baggio, Valerio Sabbatini and Claudio Sebastiani</i>	
Visual and beyond: densifying data for rehabilitation projects .....	321
<i>André Ferreira, Nuno Ramos, Miguel Almeida and Sílvia Aires</i>	
Managing a complexity of details. Studies to re-use the stable of the Calendasco’s castle.....	323
<i>Michela Marisa Grisoni, Nicola Badan and Davide Zanon</i>	
Climate impacts on architectural heritage, an overview on deterioration processes and potential use of new technologies.....	337
<i>Diogo Bernardes Pereira, Pedro Miguel Rodrigues, Eduarda Vieira, Patrícia Moreira and Liliana Araújo</i>	

## **Diagnostics archive data for the analysis of the Architectural Heritage's conservation state**

**Morero Laura<sup>1,2</sup> - Visone Francesca<sup>1,2</sup> - Porcari Vito Domenico<sup>1</sup> - Guida Antonella<sup>1,2</sup> - Masini Nicola<sup>1,2</sup>**

<sup>1</sup> University of Basilicata, DiCEM - Department of European and Mediterranean Culture: Architecture, Environment and Cultural Heritage, Matera, Italy, e-mail: (francesca.visone, laura.morero, vito.porcari, antonella.guida)@unibas.it

<sup>2</sup> CNR - National Research Council of Italy, ISPC- Institute of Heritage Sciences, Potenza, Italy, e-mail: nicola.masini@cnr.it

### **Extended abstract**

Placed as a hinge between analysis and decisions on interventions, the diagnosis involves interpretations on whose correctness may depend largely on the outcome of restorations and the future life of the building.

In the context of diagnosis, an important role is played by the knowledge of the history of restoration interventions and the investigations connected to them in order to orient and finalise new diagnostic investigations and to compare data acquired at different times with the dual purpose of integrating them and discovering constructive and structural variations occurred.

In fact, the knowledge of buildings can benefit from a significant advancement by means of instrumental investigations through which it is possible to retrace techniques and measuring instruments used throughout the various epochs, analysing their complementarity, interpretations, limitations and progress over time.

The diagnostic cognitive project is therefore a complex procedure that defines, depending on the characteristics of the property under examination, the set of scientific investigations preliminary to restoration and related to monitoring during and after interventions.

This integrated methodology aspires to multiple objectives including the support and design of a new investigation plan made reliable and effective through “archival diagnostics”.

Such diagnostics opens infinite opportunities: validating or refuting operational hypotheses of previous investigations, filling knowledge gaps, integrating and expanding the available datasets by intervening on the technological gaps of previous diagnostic investigations that may not have allowed data to be acquired at the appropriate resolution, etc.

The methodological procedure that is going to be proposed would allow to carry out a diagnosis of the state of preservation using non-instrumental diagnostics by replacing laboratories with archive rooms, reading and interpreting folders full of documents, reports.

In this sense, archival research stands as a means of adding information on the conservation history and degradation, representing a useful diagnostic tool.

Whether in addition to the diagnostic data, anamnestic data are also available, and therefore the history of the restorations carried out over time and traced through archival study, the value of the data is even greater, as is the multiplying effect of the process of integration and interrelation of them that will be catalogued, classified, processed, and normalized.

It will thus be possible to obtain an ordered and standardized database capable of managing, containing, comparing, analyzing, and interpreting the corpus of information collected, which becomes a valid implementation of pre-existing computer platforms dedicated to architectural heritage.

This approach, in a view to future developments, can be made more immediate and effective from an operational point of view through the structuring of communicating and correlated cards that would contain all the information recorded or deduced in the various survey campaigns, generating a data system of great interest for the historical-critical process of knowledge.

The card designed for diagnostic surveys would, in fact, make it possible to relate a considerable amount of heterogeneous data by means of key elements such as the type of investigation conducted, the architectural element investigated, the construction material, etc. Each card would talk about the individual experimental test, indicating its type, the methodology of execution, the staff involved and the results obtained.

The system, therefore, would be configured as a sort of expeditious cataloguing that collects a dataset of information common to several folders, from which it will then be possible to extrapolate information of a specific nature in a critical and comparative manner.

This generates a fluid process of information exchange and sharing, all aimed at integrating the conservation project and the maintenance plan.

Hence the intention to begin a critical and methodological reasoning on the added value that anamnesis and diagnosis based on archive data can provide from a cognitive and design point of view.

A case study that significantly validates the proposed methodology is the Cathedral of Troia (province of Foggia), one of the most valuable examples of Romanesque architecture in southern Italy.

The archival anamnesis of the Cathedral has allowed to explore how knowledge has grown over time through the study of restorations conducted over a time range that has no equal: from the mid-19th century to the entire 20th century, up to the early 2000s.

In this perspective, the Cathedral of Troia, as a palimpsest of practices and techniques, represents a useful tool for planning further studies and research on the architectural structure. The paper retraces the history of the diagnostic investigations and monitoring carried out on the Cathedral between 1992 and 2004 from the analysis of published sources and unpublished archival funds.

The present work aims to discuss the potential, limits and opportunities provided by the integration of data obtained from laboratory analyses, in situ investigations and the study of constructive aspects, as a methodology suitable for a multiscale assessment and a complete vision of the monument's state of conservation, which is fundamental for the realization of conservative and preventive interventions (also to optimize maintenance costs).

**Keywords:** Troia Cathedral, Diagnostic methods and tools, Archive diagnostics, Big Data, Architectural conservation

