

PROF ENRICO QUAGLIARINI

UNIVERSITÀ POLITECNICA DELLE MARCHE, IT

Curriculum Vitae

**Prof. Enrico Quagliarini, PhD**

Università Politecnica delle Marche (UNIVPM)
Department of Construction and Civil Engineering and Architecture
via Brece Bianche s.n.c., 60131 Ancona
+39 071 2204248
e.quagliarini@univpm.it
<http://www.univpm.it/enrico.quagliarini>

ACADEMIC SHORT PROFILE

2021-present Head of Department of Construction and Civil Engineering and Architecture (UNIVPM)
2014-present Full Professor of Architectural Engineering (at UNIVPM)
2004-14 Assistant Professor of Architectural Engineering (at UNIVPM)
2002 PhD in Building Engineering (at UNIVPM)
1998 Graduated in Building Engineering at UNIVPM. Final mark: 110/110 cum laude

NATIONAL GRANTS

2002-2003 2 Post-doc fellowships from UNIVPM (1.06.2003-31.12.2003; 1.04.2002-31.03.2003)
1998-2002 1 PhD grant in Building Engineering from UNIVPM (1998-2000)

SPECIALIZATION SCHOOLS

2001 Advanced course on "Restoration of A. Palladio's Villa Zenò at Cessalto. 6th International workshop on Architectural Restoration". C.I.S.A. "A. Palladio", Vicenza - Cessalto, Italy.
2000 European doctoral course: "Sciences and Materials of the Cultural Heritage". European University Centre for Cultural Heritage, Ravello, Italy.

RESEARCH ACTIVITIES

Author of more than **290 international and national scientific papers**, including 4 books, 111 Scopus-ranked papers (h index=27; citations = 2311 from Scopus, March 2022), 87 ISI-ranked papers (h index = 23; citations = 1802 from WoS, March 2022), and 1 patent.

Scientific Responsible of several R&D projects (>850k€).

His skills are focused on the conservation and retrofitting of existing constructions and now mainly deal with the **behavioural-based assessment of existing Built Environments for risk reduction** and evacuation strategies in **single and multi-hazard events** such as earthquake, flood as well as fire, overcrowding and terrorist acts. Such activities are oriented towards user behaviors testing, analysis and modelling, mainly devoted to outdoor and urban scenarios and also cover the development, validation and application of **risk assessment and simulation** (i.e. Agent Based) **tools**.

Reviewer for the most important international journals on these topics, on which he attended **over 50 invited lectures** in National and International Conferences and in Regional Federations or Councils of Professional Associations of Engineers, District Professional Associations of Engineers, Architects and Surveyors, and Public Administrations for continuing education professional courses.

Consultant on several monuments (i.e. Proto-monastery of S. Chiara, Monastery of S. Quirico, Convent-Sanctuary of S. Damiano (Ancient area) and Monastery of S. Andrea at Assisi; Lodge of the Captain of Forgiveness at S.M. degli Angeli; Monastery of S. Lucia at Foligno; Church of S. Domenico at Cingoli; "Cerbelli" Palace at Fabriano; Villa Ficana's raw earthen houses at Macerata; Church of Holy Mary of Charity and Filarmonici's Theatre at Ascoli Piceno; Lossetti's Tower at Beura Cardezza; Chapel of S. Carlo Borromeo at Prague; Fortress of Gradara; Fortress of Senigallia). He participated to **the Great Pompeii Project**.

He was involved by the National Engineers Council in the **support work for the prevention activities to the Majors of the cities struck by the seismic crisis** started on 20.05.2012 in the Emilia Romagna Region (Italy), and in the evaluation activity of the damages and the safeness of the buildings struck by the same crisis.

He is currently the **Principal Investigator** of the Project of Relevant National Interest, funded by the Italian Ministry of the University and Research, "**BE S2ECURE** - (make) Built Environment Safer in Slow and Emergency Conditions through behaviorally assessed/designed Resilient solutions", involving 4 other Italian Universities: Politecnico di Bari, Università di Bologna, Politecnico di Milano, Università La Sapienza di Roma (total funds about 980k€).

COMPETITIVE RESEARCH

- BE S2ECURE - (make) Built Environment Safer in Slow and Emergency Conditions through behaviorally assessed/designed Resilient solutions (2019-22), PRIN (Project of Relevant National Interest funded by the Italian Ministry of the University and Research (MIUR): **Principal Investigator**
- Enhancement of Marche Region's historic watermill, Marche Region Cultural Plan 2017-19 funds: 2020-21: **research staff member**
- Study of structural behavior and analysis of the state of conservation, degradation and diseases of the Gradara's Fortress, funded by Italian Ministry of Cultural Heritage (2020-21): **UNIVPM coordinator and research staff member**
- Study of structural behavior and analysis of the state of conservation, degradation and diseases of the della Rovere's Fortress at Senigallia, funded by Italian Ministry of Cultural Heritage (2020-21): **UNIVPM coordinator and research staff member**
- BRIDGE - Building Resilience to flood Impact Deriving from Global warming in Europe, funded by UNIVPM (2016-17): **research staff member**
- The Great Pompeii Project: Plan of Knowledge lotto n.3 (2015), National Project by European Regional Development Fund: **supervisor of the structural inspections and research staff member**
- RiBuild - Robust Internal Thermal Insulation of Historic Buildings, H2020 EE-03-2014: Energy strategies and solutions for deep renovation of historic buildings (grant agreement No 637268) (2015-2020): **research staff member**
- SHELL (Shared interoperable Home Ecosystems for a green, comfortable and safe Living)-MIUR Technological National Cluster (CUP D78C13000140008) (2014-2020): **research staff member**
- Seismic performances of Italian National Museums, National Project (2014-15): **research staff member**
- Seismic standards and maintenance of the original peculiarities of building structures. Case studies and retrofitting guidelines, Project of Relevant National Interest funded by the Italian Ministry of the University and Research (MIUR) (1999): **research staff member**

PATENTS AND TECHNOLOGY TRANSFER

Inventor of the **Italian Patent** n. 1406989 "Method for reinforcing building works and building works reinforced by this method", 21.03.2014

2012-2021: **Co-founder** and past vice-president of the academic **Spin-Off AhRTE** llc (Architectural heritage Restoration through Tailored Engineering) www.ahrte.it

REVIEWER FOR

ISI-ranked journals: Applied Materials & Interfaces; Building and Environment; Ceramics International; Coatings; Construction and Building Materials; Engineering Structures; Environmental Hazards; Habitat International; International Journal of Architectural Heritage; Journal of Scientific Research and Reports; International Journal of Disaster Risk Reduction; Journal of Building Engineering; Journal of Cultural Heritage; Materials and Structures; Municipal Engineer; Natural Hazards; Progress in Organic Coatings; Safety Science; Scientific Research and Essays; Structures

Scopus-ranked journals: Int. J. of Masonry Research and Innovation; POLLACK PERIODICA An International Journal for Engineering and Information Sciences.

Woodhead Publishing Book Series in Civil and Structural Engineering (Elsevier)

Springer Book Series in Engineering (Springer-Verlag Ltd)

Book Series Constructive culture for a sustainable retrofitting (Edicom Publisher)

RESEARCH ACTIVITIES ABROAD

International "Burnum Project: testing ND methodologies on an archaeological site: the Roman castrum of Burnum (HR)", University of Zadar, University of Bologna, Civic Museum of Drnis and relative archaeological expeditions (2007, 2011) (HR): **research staff member**

EDITORIAL BOARD AND SCIENTIFIC/TECHNICAL COMMITTEES AND CONFERENCE CHAIRMAN

2015-present

Associate Editor TEMA Technologies, Engineering, Materials and Architecture (ISSN 2421-4574)

<https://rivistatema.com/editorial-board/>

2016-present

Advisory Board Member GROMA documenting archaeology (ISSN 2531-6672)

<https://groma.unibo.it/about#nt-0>

2019-present

Editorial Board Member Coatings (ISSN 2079-6412) <https://www.mdpi.com/journal/coatings/editors>

2017-present

Member of the Scientific Committee book series: Heritage Architecture, Construction and Retrofitting, Aracne Publisher

2019

Colloqui.AT.e 2019 - Ingenuity and construction in the age of complexity (Torino, 25-28.09): **member of the scientific commission**

Rehab 2019 - 4nd International Conference on Preservation, Maintenance and Rehabilitation of Historic Buildings and Structures (Guimaraes, Portugal, 17-19.07): **member of scientific committee** and **chairman** of the working session of 19.07 and of the final debate.

2018

Heritage 2018 - 6nd International Conference on Heritage and Sustainable Development (Granada, Spain, 12-15.06): **member of the scientific committee**

Colloqui.AT.e 2018 - Circular Building (Cagliari, 12-14.09): **member of the Advisory Board**

2017

ReHab 2017 - 3nd International Conference on Preservation, Maintenance and Rehabilitation of Historic Buildings and Structures (Braga, Portugal, 14-16.06): **member of the scientific committee** and **chairman** of the working sessions S05 e S18

Colloqui.AT.e 2017 - Demolition and Reconstruction? (Ancona 28-29.09): **member of the Advisory Board**

2016

Colloqui.AT.e 2016 - "MATER(i)A" (Materials, Architecture, Technology, Energy/Environment, Reuse, (Interdisciplinarity), Adaptability) (Matera, 12-15.10): **member of the Advisory Board**

2015

ReHab 2015 - 2nd International Conference on Preservation, Maintenance and Rehabilitation of Historic Buildings and Structures (Porto, Portugal, 17-19.07): **member of the scientific committee**

2015

Guest Editor Special Issue "Self-Cleaning, Biocide and Depolluting Coatings for Architectural and Archaeological Heritage", Coatings (ISSN 2079-6412)

2007

Member of the Organizing Committee and Scientific Secretariat of 2 International Congress (Ar.Tec. 2007, Ancona, Italy; Ar.Tec. 2017, Ancona, Italy)

2004-2012

Member of UNI Technical Committees (Italian Organization for Standardization):

Working Group U840026 "Cultural Heritage Materials" and Working Group U840025 "Guide lines and terminology"

NORMAL Working Group 20: "Wood and wooden products"

NATIONAL AND INTERNATIONAL ACKNOWLEDGMENTS/AWARDS

2019-2021

Head of the Scientific and Teaching activities of the Building Science & Technology Lab (UNIVPM), equipped with the most advanced technologies about monitoring, analysing and simulating human behaviour in emergency into built environments

2018-present

Elected member of the UNIVPM's Central Guarantee Committee for equal opportunities, enhancement of workers' health and against discriminations

2015-2018

Elected member of the UNIVPM's Central Guarantee Committee for equal opportunities, enhancement of workers' health and against discriminations

2015-present

Member of the board of the UNIVPM Smart Living Lab R&D center

2019

Best paper award REHAB2019 topic 08: Seismic risk analysis for disaster prevention in historic centres: a novel methodology for assessing evacuation paths safety

Best paper award Colloqui.AT.e 2019 topic A: Il castello di Roccamandolfi tra conservazione e innovazione

2018

Team leader of the **winning project e-Capital 2017** (20 k€) for the business project LE(a)D-ME (Lead Evacuees to a safe Destination while Moving in Emergencies)

2017

Best paper award REHAB2017: Earthquakes and historic masonry buildings: an experimentally-based algorithm for debris formation prediction

Best paper award REHAB2017 topic 02: Earthquakes and historic masonry buildings: an experimentally-based algorithm for debris formation prediction

Best paper award REHAB2017 topic 07: Experimental investigation of masonry columns strengthening using basalt fibre ropes: first results

2014

Best paper award REHAB2014 topic: Basalt ropes: a new product for the rehabilitation of historical masonry.

2013

Team leader of the **winning project** of the e-Capital Business Plan Competition 2012 (20k€) for the best business plan ideas for the spin-off AhRTE

"You can reduce" Award 2012-13 for the project 'Stitching stone trough stone' by the spin-off AhRTE llc. sponsored by Regione Marche, UPI Marche, ANCI Marche, Legambiente Marche, Federambiente and Unioncamere Marche

2012

Researcher award (10k€) sponsored by UNIVPM: 1st classified for the Civil and Architecture Area

2010

Scientific Research award (12.5k€) sponsored by UNIVPM: 1st classified for the Civil and Architecture Area

SCIENTIFIC RESPONSIBLE OF:

EXTERNALLY SPONSORED RESEARCH (> 240k€)

2021-2022

Post-doc fellowship on "Flood Risk Assessment, Mitigation and Management in Coastal Cities through a Behavioural-Design Approach", 100% sponsored by CRUI (The Conference of Italian University Rectors)

2020-2023

PhD grant on "Historic masonry of the Marche Region", sponsored by UNIVPM (50%) and Professional Association of Engineers of the District of Ancona (50%)

2013-2016

PhD grant on "Seismic risk of historical city centres: the culture of prevention", sponsored by UNIVPM (50%) and Professional Association of Engineers of the District of Ancona (50%)

2013-2014

Post-doc fellowship on "Assessment and definition of guidelines for reducing the seismic risk of the post World War 2 RC framed school buildings at Senigallia (AN, Italy)", 100% sponsored by the Municipality of Senigallia (AN, Italy)

2012-2013

Post-doc fellowship on "Code of practice for designing intervention on historical and monumental buildings: looking for an equilibrium point between conservation and safety", 100% sponsored by Res.In.Tec. Ilc.

2009-2012

PhD grant on "Innovative engineering methods for Cultural Heritage conservation. Their applications on frescoes and stuccoes made on light construction systems", sponsored by UNIVPM (50%) and Res.In.Tec. Ilc (50%).

RESEARCH GRANTS SPONSORED BY UNIVPM (> 80€)

2020 Terroristic risk management and reduction strategies in Built Environments: a behavioural approach

2019 Flood risk reduction strategies in historic centres

2018 Towards a "behavioural design" approach for over-crowding risk reduction strategies in open public spaces

2017 Towards a "behavioural design" approach for flooding risk reduction strategies

2016 Towards a "behavioural design" approach for seismic risk reduction strategies of buildings and their environment.

2015 Durability of self-cleaning TiO₂ coatings on fired brick facades

2014 Self-cleaning and biocide surfaces for Architectural Heritage.

2013 Smart surfaces for Architectural Heritage: TiO₂ coatings on stone surfaces

2012 Self-cleaning and depolluting materials for Architectural Heritage.

2011 Innovative engineering methods for Cultural Heritage conservation. Applications on frescoes and stuccoes on the lower surface of light suspended vault.

2010 Safety and conservation of the Monumental and Archaeological Architectural Heritage.

2009 On the damage of light suspended vault.

- 2008 Flat vaults in Italian-style theatre in the 18th - 19th centuries: 'workmanlike' related to the operative working criteria.
- 2007 Wooden structures in Italian-style theatre in the 18th - 19th centuries: from the 'workmanlike' to the operative working criteria
- 2006 FRP reinforcements during the 1980's first years: durability field testing
- 2005 Field testing of the durability of FRP reinforcements applied in architectural restoration of masonry structures
- 2004 Thermal compatibility of FRP strengthening on masonry structures.
- 2002 Innovative retrofitting technologies for light thin vaults with high artistic value lower surface
- 2000 FRP retrofitting works on architectural heritage: durability and efficiency problems

SCIENTIFIC RESEARCH GRANTS EXTERNALLY SPONSORED BY ITALIAN PUBLIC ADMINISTRATIONS AND SMEs (> 190k€)

- 2018 Study and mechanical characterisation of FRCM systems applied to brick and tuff masonry (Biemme Ilc)
- 2013 "TLS survey of the Lossetti's Tower (Municipality of Beura Cardezza)
Preliminary assessment of the diagonal compression strength of masonry panels, made by gneiss stones with no mortar joints, reinforced through the TICORAPSIMO(R) system (Municipality of Beura Cardezza)
- 2012 Assessment and definition of guidelines for reducing the seismic risk of the post-World War 2 RC framed school buildings at Senigallia (AN) (Municipality of Senigallia)
- 2011 A first study about the underground cavities of the historic centre of Corinaldo and a first evaluation of their influence on its seismic risk (Municipality of Corinaldo)
- 2010 Retrofitting interventions for the reduction of the seismic vulnerability of the Church of S.Maria della Carità at Ascoli Piceno (Municipality of Ascoli Piceno)
- 2009 A first evaluation of the seismic vulnerability of the Church of S.Maria della Carità at Ascoli Piceno (Municipality of Ascoli Piceno)
- The design of the retrofitting interventions on the Filarmonici's Theatre light vault at Ascoli Piceno (Municipality of Ascoli Piceno)
- 2008 How to design retrofitting interventions on the Filarmonici's Theatre light vault at Ascoli Piceno (Municipality of Ascoli Piceno)
- 2007 A first study about the feasibility of recovering the Filarmonici's Theatre light vault at Ascoli Piceno (Municipality of Ascoli Piceno)

AFFILIATIONS

- 1999-present Professional Association of Engineers of the District of Ancona
- 2008- present Member of the Italian Architecture and Technique Association (Ar.Tec.)
- 2015 Member of the International Masonry Society

2018-present National Interuniversity Consortium for Materials Science and Technology

STITUTIONAL ACADEMIC ACTIVITIES

Member of the **Organizing Committee** of the 1st Master in "Analysis, Conservation and Enhancement of Historic Architecture", 2013/2014, UNIVPM -Marche Region

Member of the following UNIVPM **PhD Academic Board**:

2013-present

"Civil, Environmental, Building Engineering and Architecture"

2011-15

"Civil, Building Engineering and Architecture"

2011-14

"Classical architecture and Vitruvian studies. Analyses, representation, communication, protection"

2005-13

"Architecture, Constructions and Structures"

2004 -07

"Engineering - Architecture: Adriatic cities and environmental sustainability"

Advisor (assistant advisor) of 8 (4) PhD theses

Supervisor (assistant supervisor) of 64 (36) MSc degree theses and 39 (4) BSc degree theses

ASSIGNED COURSES (at UNIVPM)

EU MSc in Building Engineering and Architecture:

2018-present Retrofitting and Conservation of Architectural Heritage

2014-18 Retrofitting and Conservation of Buildings

2010-14 Architectural Engineering 2

MSc in Building Engineering:

2017-present Historic Constructions and Retrofitting Design

2014-17 Retrofitting interventions design on buildings

2006-08 Architectural Restoration and Laboratory

2005-10 Retrofitting and Conservation of Buildings

2004-05 Architectural Engineering

BSc in Building Constructions and Retrofitting Engineering:

2004-10 Architectural Engineering module 3

post-graduate Master in "Analysis, Conservation and Enhancement of Historic Architecture" (2013-14):

History of Construction Techniques

Seismic vulnerability of historic city centres

2021 - SELECTED PUBLICATIONS¹

- 1) D'ORAZIO M., BERNARDINI G., **QUAGLIARINI E.** (2021) A probabilistic model to evaluate the effectiveness of main solutions to COVID-19 spreading in university buildings according to proximity and time-based consolidated criteria, *Building Simulation*, 14 (6) 1795 - 1809, DOI 10.1007/s12273-021-0770-2
- 2) BERNABEI L., MOCHI G., BERNARDINI G., **QUAGLIARINI E.** (2021) Seismic risk of Open Spaces in Historic Built Environments: A matrix-based approach for emergency management and disaster response, *International Journal of Disaster Risk Reduction*, 65, DOI 10.1016/j.ijdr.2021.102552
- 3) BERNARDINI G., **QUAGLIARINI E.** (2021) Terrorist acts and pedestrians' behaviours: First insights on European contexts for evacuation modelling, *Safety Science* 143 DOI 10.1016/j.ssci.2021.105405
- 4) BERNARDINI G., FINIZIO F., POSTACCHINI M., **QUAGLIARINI E.** (2021) Assessing the flood risk to evacuees in outdoor built environments and relative risk reduction strategies, *International Journal of Disaster Risk Reduction*, 64, DOI 10.1016/j.ijdr.2021.102493
- 5) D'ORAZIO M., BERNARDINI G., **QUAGLIARINI E.** (2021) Sustainable and resilient strategies for touristic cities against COVID-19: An agent-based approach, *Safety Science*, 142 DOI 10.1016/j.ssci.2021.105399
- 6) D'AMICO A., RUSSO M., ANGELOSANTI M., BERNARDINI G., VICARI D., **QUAGLIARINI E.**, CURRÀ E. (2021) Built environment typologies prone to risk: A cluster analysis of open spaces in Italian cities, *Sustainability*, 13 (16) DOI 10.3390/su13169457
- 7) BERNARDINI G., ROMANO G., SOLDINI L., **QUAGLIARINI E.** (2021) How urban layout and pedestrian evacuation behaviours can influence flood risk assessment in riverine historic built environments, *Sustainable Cities and Society*, 70 DOI 10.1016/j.scs.2021.102876
- 8) CADENA J.D., SALVALAI G., LUCESOLI M., **QUAGLIARINI E.**, D'ORAZIO M. (2021) Flexible workflow for determining critical hazard and exposure scenarios for assessing slods risk in urban built environments, *Sustainability* 13 (82) DOI 10.3390/su13084538
- 9) **QUAGLIARINI E.**, LUCESOLI M., BERNARDINI G. (2021) How to create seismic risk scenarios in historic built environment using rapid data collection and managing, *Journal of Cultural Heritage*, 48, 93 - 105, DOI 10.1016/j.culher.2020.12.007
- 10) CADENA J.D., MORETTI N., SALVALAI G., **QUAGLIARINI E.**, CECCONI F.R., Poli T. (2021) A new approach to assess the built environment risk under the conjunct effect of critical slow onset disasters: A case study in Milan, Italy, *Applied Sciences* 11 (3) 1 - 14 DOI 10.3390/app11031186

¹ The full list of publications can be found at <http://prodapps.econ.univpm.it/iris/index.php?docente=ENRICO%20QUAGLIARINI&facolta=INGENERIA>

- 11) POSTACCHINI M., BERNARDINI G., D'ORAZIO M., **QUAGLIARINI E.** (2021) Human stability during floods: Experimental tests on a physical model simulating human body, Safety Science, 137, 105153, <http://dx.doi.org/10.1016/j.ssci.2020.105153>
- 12) **QUAGLIARINI E.**, FATIGUSO F., LUCESOLI M., BERNARDINI G., CANTATORE E. (2021) Risk Reduction Strategies against Terrorist Acts in Urban Built Environments: Towards Sustainable and Human-Centred Challenges, Sustainability, 13(2), 901; <https://doi.org/10.3390/su13020901>
- 13) **QUAGLIARINI E.**, GREGORINI B., D'ORAZIO M. (2021) An empirical failure model to predict biofouling growth on fired bricks due to microalgae, Journal of Building Engineering 44 DOI 10.1016/j.job.2021.102965
- 14) DONNINI J., MARACCHINI G., LENCI S., CORINALDESI V., **QUAGLIARINI E.** (2021) TRM reinforced tuff and fired clay brick masonry: Experimental and analytical investigation on their in-plane and out-of-plane behavior, Construction And Building Materials, 272, 121643, <http://dx.doi.org/10.1016/j.conbuildmat.2020.121643>