

Lecture Notes in Civil Engineering

Rossella Corrao · Tiziana Campisi ·
Simona Colajanni · Manfredi Saeli ·
Calogero Vinci *Editors*

Proceedings of the 11th International Conference of Ar.Tec. (Scientific Society of Architectural Engineering)

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Preface

The series of technical conferences on Architectural Engineering (AE) annually involve academics and experts to discuss about the recent advancements of the research in the building sector, to find and promote innovative solutions, both at buildings and components scales; to develop building systems and materials, able to improve the energy efficiency of buildings and counteracting climate changes; to ensure the well-being of users by guaranteeing indoor and outdoor comfort; to preserve the building heritage and safeguarding cities, landscapes and territories. Since its beginning in Vico Equense, Naples, Italy, where the first Colloqui.AT.e conference was launched in 2014, the series of conference have been centered on three different Topics related to the main fields of research in Architectural Engineering. Actually, from 2004 Ar.Tec. Scientific Society promoted a series of itinerants thematic conferences focused on: the intersections between architecture and technology (Rome, 2004); the preservation of the building heritage (Tourin, 2006); the design of the building envelope (Ancona, 2007) and of the care spaces, between complexity and innovation (Pavia, 2008); the earthquake and the strategies to remember, prevent and plan (Messina, 2009); sharing technical knowledge derived from the research on building design and construction (Rome, 2011).

Colloqui.AT.e2024, subtitled: “Architectural Engineering in Italy and Worldwide. Comparing Experiences”, has also been structured upon traditional and emerging topics related to: “Construction and Conservation History”; “Construction and building performance”; “Building Design and Technologies” that allowed researchers and engineers to discuss at international level the latest developments in AE area. AE aims at providing “tools, methods, and models, including digital ones, for the knowledge and design of buildings, from the critical, systemic, functional, typological, technical, and constructive point of view”, by exploiting also the technology transfer from other fields of research belonging to different scientific sectors close to it.

The three topics have been defined as follow:

A Construction and Conservation History - Vol. 1, ISBN 978-3-031-71854-0

- A1. Materials and construction techniques in historical architecture*
- A2. Recovery, valorization, and reuse of existing building heritage*
- A3. Examples of interventions on monumental architecture*
- A4. Examples of industrial archaeology between knowledge and reuse*
- A5. Vernacular architecture: lessons learned and future projects*
- A6. Projects and policies for the regeneration of historic centers and suburbs*
- A7. Digital twins and immersive visualization for the valorization, management, and fruition of historical building heritage*

B_Building Construction and Performance

- B1. Traditional and innovative technologies and materials for buildings*
- B2. Modeling, simulation, and diagnostics under uncertainty for performance control*
- B3. Building pathologies and intervention strategies*
- B4. Building-human-environment relationships: extended accessibility*
- B5. Building management and maintenance for safety and quality of living environments*
- B6. Mitigation and management of vulnerabilities and risks for the preservation of the built environment*
- B7. Regulatory updates, quality control of the project and construction process*

C_Building Design and Technologies - Vol 3, ISBN: 978-3-031-71866-3

- C1. Form, technique, and technology*
- C2. Circular Design, Embodied Carbon, and extended buildings life cycle*
- C3. Digital transition and design of 4.0 buildings*
- C4. Technological innovation: processes, patents, and products for the construction of the future*
- C5. Integral and participatory design for the quality of the built environment*
- C6. Adaptive and responsive buildings*
- C7. DfMA – Design for Manufacturing & Assembly and DfD – Design for Disassembly*

During the conference, 9 selected papers (among the 145 scientific contributions received) and three keynote lectures have been presented. The three volumes collect all submitted and double-blind peer reviewed papers as well as the contributes related to the three valuable key lectures that opened the conference sessions.

More specifically, these three lectures were kindly provided, for Topic A_Construction and Conservation History (Vol. 1), by James W.P. Campbell, Professor of Architecture and Construction History at the University of Cambridge and Director of Studies in Architecture and History of Art in Queens' College, Cambridge, UK; for Topic B_Building Construction and Performance (Vol. 2), by Mattheos Santamouris, Scientia, Distinguished, Professor of High Performance Architecture at University of New South Wales (UNSW), in Sydney, Australia, and past Professor in the University of Athens, Greece; for Topic C_Building Design and Technologies (Vol. 3), by Joachim Eble, Architect, founder and owner of Eble Messerschmidt Partner, Tubinga, Germany.

The research papers collected in these Volumes testify that today AE multi/interdisciplinary approach can effectively contribute to the analysis and solving problems affecting buildings, cities, and the built environment, by suggesting innovative technical solutions/materials/components and strategies, which are able to guarantee the preservation of the building heritage, the well-being of users, and the appropriate actions to counteract climate changes.

The eleventh edition of the Colloqui.AT.e conference has been jointly organized by Ar.Tec. Scientific Society and the Department of Architecture of the University of Palermo, with the Patronage of: Department of Engineering of the University of Palermo,

Sicilian Region, Agenzia del Demanio Sicilia, Provveditorato Opere Pubbliche Sicilia e Calabria - Ministry of Infrastructures and Transport, Confrestauro Association. The conference was also sponsored by: BCI Bautechnik Group Srl-Buffa S.r.l. (www.buffa.eu), CNT- Domodry S.r.l. (www.domodry.it), INNOVA S.r.l. (www.innovaenergie.com), MICROGEO S.r.l. (www.microgeo.it), XLAM Dolomiti S.p.a. (www.xlamdolomiti.it/en/), CusenzaMarmi (www.cusenzamarmi.com), Guglielmino Soc. Coop. (www.guglielminocooperativa.it), and S.E.P.A.M. Stone S.r.l. (www.sepamstone.it).

On behalf of the organizing committee of Colloqui.AT.e 2024, we express our gratitude to all keynote speakers, authors, as well as to the members of the international scientific and advisory committees. We also extend our appreciation to all the participants who took part in this important international scientific event.

Special thanks goes to the publisher, Springer Nature Switzerland AG and, in particular, to Pierpaolo Riva, for his support in publishing Colloqui.AT.e 2024 proceedings. This contribution enhances significantly both dissemination and impact of our research activities in the field of Architectural Engineering. As members of Ar.Tec. Scientific Society, we are committed to continuing the tradition of Colloqui.AT.e International Conferences of spreading knowledge, excellence, and innovation of our research works related to the building sector.

Rossella Corrao

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