

Digital Innovations in Architecture,
Engineering and Construction

Andrea Giordano
Michele Russo
Roberta Spallone *Editors*


Advances in Representation

New AI- and XR-Driven
Transdisciplinarity

 Springer

Digital Innovations in Architecture, Engineering and Construction

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The Architecture, Engineering and Construction (AEC) industry is experiencing an unprecedented transformation from conventional labor-intensive activities to automation using innovative digital technologies and processes. This new paradigm also requires systemic changes focused on social, economic and sustainability aspects. Within the scope of Industry 4.0, digital technologies are a key factor in interconnecting information between the physical built environment and the digital virtual ecosystem. The most advanced virtual ecosystems allow to simulate the built to enable a real-time data-driven decision-making. This Book Series promotes and expedites the dissemination of recent research, advances, and applications in the field of digital innovations in the AEC industry. Topics of interest include but are not limited to:

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- Risk and disaster management.


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ISSN 2731-7269 ISSN 2731-7277 (electronic)
Digital Innovations in Architecture, Engineering and Construction
ISBN 978-3-031-62962-4 ISBN 978-3-031-62963-1 (eBook)
<https://doi.org/10.1007/978-3-031-62963-1>

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Preface

The volume *Advances in Representation. New AI- and XR-Driven Transdisciplinarity* collects the outcomes of experimental transdisciplinary research carried out by international teams. The discipline of representation emerges as an explorer, inventor, and creator of new methodologies, technologies, and fields of application, catalyzing and promoting unprecedented connections with other knowledge.

The volume we are about to release results from a year-long work. It was a matter of selecting international research that would show the most up-to-date panorama of innovative and experimental research in the field of artificial intelligence (AI) and extended reality (XR) and guiding them through the different stages of double-blind review to the achievement of scientifically validated results.

The contributions have been collected according to eight topics, in which the AI&XR binomial, through the mediation of representation, is experimented in the different fields of heritage, design, and education, articulated in the focus on Historical Sources, Archaeological/Museum Heritage, Heritage Routes, Classification/3D Analysis, Building Information Modeling, Building/City Monitoring, Education, Shape Representation.

Our thanks go to Francesca Fatta, president of the Unione Italiana Disegno (UID), for her advice and constant support during all phases of our work, to Alessandro Luigini, president of the IMG Network, for sharing ideas and insights, to the scientific and review committee, consisting of Marco Giorgio Bevilacqua (University of Pisa), Stefano Brusaporci (University of L'Aquila), Valeria Cera (University of Naples Federico II), Francesca Fatta (Mediterranea University of Reggio Calabria), Alessandro Luigini (Free University of Bozen-Bolzano), Federica Maietti (University of Ferrara), Barbara Ester Adele Piga (Politecnico di Milano), Cettina Santagati (University of Catania), for their proactive proposals, hard work, and continuous support. Special thanks go to Giulia Flenghi and Enrico Pupi for carefully editing this volume.

Finally, our heartfelt thanks go to the scholars who responded to the call rigorously and skillfully, with high-quality contributions that exceeded our expectations.

We hope that their papers will stimulate interest and inspiration for innovative research in readers.

Padua, Italy
Rome, Italy
Turin, Italy
April 2024

Andrea Giordano
Michele Russo
Roberta Spallone

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