

Introduction

*Original*

Introduction / Girgenti, Gianmarco; Lo Turco, Massimiliano. - STAMPA. - 4:(2023), pp. 32-34.

*Availability:*

This version is available at: 11583/2975567 since: 2023-02-03T14:36:09Z

*Publisher:*

Pavia University Press

*Published*

DOI:

*Terms of use:*

This article is made available under terms and conditions as specified in the corresponding bibliographic description in the repository

*Publisher copyright*

(Article begins on next page)

Laura Inzerillo & Francesco Acuto

edited by

# DIGITAL & DOCUMENTATION

VOL.4

PALERMO 20/09/2021



PaviaUniversityPress

Digital & Documentation. The new boundaries of  
digitization / Laura Inzerillo & Francesco Acuto (edited by) -  
Pavia: Pavia University Press, 2022. - 200 p. : ill. ; 21 cm.

ISBN 978-88-6952-164-5 (Print)

ISBN 978-88-6952-165-2 (Paper)

The present publication is part of the series "Prospettive multiple: studi di ingegneria, architettura e arte", which has an international referee panel. "Digital & Documentation: The New Boundaries of Digitization" is a scientific text evaluated and approved by the Editorial Scientific Committee of **University of Palermo**.

The author is available to those having rights which have been unable to communicate for any omissions or inaccuracies.



PaviaUniversityPress

Pavia University Press  
Edizioni dell'Università degli Studi di Pavia  
info@paviauniversitypress.it  
www.paviauniversitypress.it

Copyright © 2022 Egea S.p.A.  
via Salasco, 5 - 20136 Milano  
Tel. 02/5836.5751 - Fax 02/5836.5753  
egea.edizioni@unibocconi.it  
www.egeaeditore.it

EDITING  
Laura Inzerillo, Francesco Acuto

GRAPHIC PROJECT  
Laura Inzerillo, Francesco Acuto

PRINTED BY  
Logo S.r.l Borgoricco (PD)

On cover: Graphic photocollage by Laura Inzerillo  
and Francesco Acuto

The rights of translation, electronic storage, reproduction and even partial adaptation, by any means, are reserved for all countries.

The photocopies for personal use of the reader can not exceed 15% of each book and with payment to SIAE of the compensation provided in art. 68, c. 4, of the Law 22 of April of 1941, n. 633 and by agreement of December 18, between SIAE, AIE, SNS and CNA, ConfArtigianato, CASA, CLAAI, ConfComercio, ConfEsercenti. Reproductions for other purposes than those mentioned above may only be made with the express authorization of those who have copyright to the Publisher.

The volume consists of a collection of contributions from the seminar "Digital & Documentation: The New Boundaries of Digitizing", realized at the University of Palermo on the day of September 2<sup>nd</sup>, 2021. The event, organized by the experimental laboratory of research and didactics MetaLab 3D of DIING- Department of Engineering of University of Palermo promotes the themes of digital modeling and virtual environments applied to the documentation of architectural scenarios and the implementation of museum complexes through communication programs of immersive fruition.

The event has provide the contribution of external experts and lecturers in the field of digital documentation for Cultural Heritage. The scientific responsible for the organization of the event is Laura Inzerillo, University of Palermo.

#### ORGANIZATION COMMITTEE

Laura Inzerillo	University of Palermo
Francesco Acuto	University of Palermo

#### ORGANIZATION SECRETARIAT

Laura Inzerillo	University of Palermo
Francesco Acuto	University of Palermo

#### SCIENTIFIC COMMITTEE Salvatore

Barba	University of Salerno
Stefano Bertocci	University of Florence
Cecilia Bolognesi	Polytechnic of Milan
Stefano Brusaporci	University of L'Aquila
Alessio Cardaci	University of Bergamo
Antonio Conte	University of Basilicata
Antonella di Luggo	University of Naples Federico II
Francesca Fatta	University "Mediterranea" of Reggio Calabria
Mariateresa Galizia	University of Catania
María Concepción López González	Universitat Politècnica de València
Laura Inzerillo	University of Palermo
Elena Ippoliti	University of Rome "La Sapienza"
Massimiliano Lo Turco Alessandro	Politecnico di Torino
Luigini	Free University of Bozen
Svetlana Maximova	Perm National Research Polytechnic University
Andrés Martínez Medina Andrea	Universitat d'Alacant
Nanetti	Nanyang Technological University of Singapore
Pablo Rodríguez Navarro Caterina	Universitat Politècnica de València
Palestini	University of Chieti-Pescara "G. D'Annunzio"
Sandro Parrinello	University of Pavia
Sofia Pescarin	Institute for Technologies applied to Cultural Heritage
Paolo Piumatti	Politecnico di Torino
Cettina Santagati	University of Catania
Alberto Sdegno	University of Udine
Roberta Spallone	Politecnico di Torino
Graziano Mario Valenti	University of Rome "La Sapienza"

This publication is made with the contribution of DIING, Department of Engineering of University of Palermo.



University of Palermo



Dipartimento di Ingegneria

The event "Digital & Documentation" has seen the participation of professors, researchers and scholars from University of Palermo, University of Pavia, University of Bolzano, University of Rome "La Sapienza", University of Roma3, University of Catania, Politecnico di Torino, Politecnico di Milano.



University of Pavia



Politecnico di Torino



University of Rome "La Sapienza"



University of Catania



Associazione Italiana Disegno

“Ogni uomo confonde i limiti del suo campo visivo  
con i confini del mondo”

*Arthur Schopenhauer*



# INDEX

PREFACE	09
SANDRO PARRINELLO DRAWINGS UPDATING AND LANGUAGES REWRITING FOR THE STRUCTURING OF KNOWLEDGE	10
LAURA INZERILLO THE NEW BOUNDARIES OF DIGITIZATION: from bim to parametric modelling	14
KEYNOTE SPEAKERS	19
CECILIA BOLOGNESI DIGITIZING IN THE 2.0 ERA	20
SESSION I - BIM	31
INTRODUCTION GIANMARCO GIRGENTI - MASSIMILIANO LO TURCO	32
DANIELA ORENI HBIM FOR HISTORICAL HERITAGE CONSERVATION AND RESTORATION ACTIVITIES: the question of the 3D modelling	36
PIERPAOLO D'AGOSTINO & GIUSEPPE ANTUONO TOWARD THE AUTOMATION OF DIGITIZATION. BIM experiences of management, classification and reconstruction of building and architectural components.	46
MARIKA GRIFO SEMANTICS THROUGH MODELS. <i>Ex ante</i> and <i>ex post</i> classification processes	60
ANNA DELL'AMICO SCAN TO H-BIM, DRAWING INFORMATION AND MODEL SHARING PROTOCOLS. The case study of the Castiglioni Brugnatelli college (PV)	72
GIORGIA POTESTÀ MODELLING AND TRADEOFFS. Limits and potential of the BIM platform for the architectural heritage	88



## SESSION II - DIGITIZATION OF ARCHIVAL DRAWINGS 107

### INTRODUCTION 108

VINCENZA GAROFALO  
CETTINA SANTAGATI

SANDRA MIKOLAJEWSKA

SMART SURVEY METHODOLOGIES FOR THE DIGITIZATION OF ARCHITECTURAL DRAWINGS.

The maps of some convents located in the city of Parma, drawn by Giuseppe Cocconcelli in 1811 112

MATTEO FLAVIO MANCINI

DIGITAL MODELS FOR HISTORICAL AND CONTEMPORARY ARCHITECTURAL ARCHIVES: Experiments and reflections 122

## SESSION III - PARAMETRIC MODELLING AND VIDEO MAPPING 137

### INTRODUCTION 138

FRANCESCO DI PAOLA  
GRAZIANO VALENTI

MARCO FILIPPUCCI

GENERATIVE REVOLUTION: representative experimentations at the frontiers of computational design 142

DOMENICO D'UVA

PARAMETRIC MAPPING AND MACHINE LEARNING. Experimental tool to analyse landscape in slow mobility paths 162

GIORGIO BURATTI

COMPUTATIONAL DESIGN IN THE STUDY OF FORMS OF NATURE 170

MIRCO CANNELLA

TECHNIQUES AND PROCEDURES FOR THE DEFINITION OF AR applications in architectural and archaeological contexts 180

## ROUND TABLE 192

FABRIZIO AGNELLO  
FRANCESCO MAGGIO  
MANUELA MILONE

WILL DRAWING BE USED TO STUDY AND TEACH ARCHITECTURE IN THE NEXT CENTURY? 193

## CONCLUSIONS 197

LAURA INZERILLO

SESSION - I

BIM



**GIANMARCO GIRGENTI**  
University of Palermo

Ph.D., Gianmarco Girgenti is Researcher ICAR/17 at the Department of Architecture (D'ARCH) of the Palermo University.

He conducts researches on Visual Culture and Imagery, on City Design and on the Survey of the Historical Heritage of Architecture aimed at multimedia dissemination. He has focused his interest on three-dimensional reconstructions on an urban scale of disappeared or never built architectures, relocating their reinterpretations in virtual figuration systems linked to maps and Open Data. He collaborates with educational institutions in the organization of events to promote and raise awareness of the Culture and Didactics of Cultural Heritage.



**MASSIMILIANO LO TURCO**  
Politecnico di Torino

Ph.D., Massimiliano Lo Turco is Associate Professor ICAR/17 at the Department of Architecture and Design (DAD) of the Politecnico di Torino. He conducts research activities in the field of digital architecture survey and modeling. He has been dealing for years in analyzing the capabilities of Building Information Modeling and Visual Programming Language applied to Cultural Heritage.

Principal Investigator of the BACK TO THE FUTURE's project, developed together with the Museo delle Antichità Egizie di Torino. Program Director of the Bachelor's Degree in Architettura/Architecture of the Politecnico di Torino since 2018.

# INTRODUCTION

The contributions critically reflect on the characteristics and uses that the three-dimensional digital models set up through an HBIM approach and referred to the built heritage can be usefully employed not only to support the design activity but also for integrated multidisciplinary approaches related to conservation and documentation initiatives.

The reflections that emerge from the critical analysis of the various case studies illustrated by the invited speakers are particularly interesting: the authors measure themselves on a multiplicity of themes all referable to the discipline of Drawing, such as the scale of representation and their relationship with the granularity of the model. Moreover, the quantification of the deviation between the numerical model -intended as the outcome of the sampling of representative parts of an artifact or part of it- and its conversion into a mathematical model, in which the numerical codes are structured and organized to describe geometric shapes, dimensions or qualitative information useful for their representation.

In the BIM approach, the mathematical model assumes the additional connotation of information model, where some workflows can provide algorithmic approaches that integrate Visual Programming Language systems, highlighting strengths and weaknesses of the most recently designed workflows. This allows to outline future research perspectives, in relation to the exploration of the potential of automatic classification through Artificial Intelligence

algorithms, which constitute the boundaries of research and, although of extreme interest, cannot yet be considered as fully defined and shared standards.

Another issue discussed in the following contributions is the opportunity to integrate the alphanumeric attributes of the BIM virtual environment with an ontological structure of data, aimed at the production of a more structured database and able to fully define the logical relationships between the parts.

With regard to the restitution of reality-based artifacts, it is more appropriate than ever to dwell on the evaluation of the best technologies for the optimization of mobile scanning survey protocols and the three- dimensional representation of the historical built heritage, to be adopted for an effective process of measurement and subsequent restitution of the artifacts. For specific activities characterized by a high level of complexity such as those illustrated below, it is crucial to define strategies, approaches and structured protocols to implement shared work actions, so as to obtain elaborations of a very high-quality level consistent with the limited time that projects and consultancies foresee.

Through interoperable practices it is therefore possible to conceive operational scenarios in which all the actors involved can directly implement the data recorded in situ in an agile and accessible way. To do this, it is essential to support the object-oriented paradigm with the conceptual aspects of relational approaches useful for the management

of heterogeneous, numerous and constantly updated data. From a more scientific point of view, the application of these principles will allow us to face and define new methodologies for the knowledge (and representation) of the Cultural Heritage through more transparent processes. Therefore, the reflections on integrated approaches of investigation leading to new forms of Drawing able to expand the frontiers of our discipline in the direction of a greater formal qualification and in the permanent relationship between architectural space and information space appear extremely interesting. In this regard, the London Charter defines the principles to be followed for the three-dimensional representation of Cultural Heritage, in line with the values of transparency, communicability and repeatability of the methods and results of the modeling processes. We agree that knowledge is the first stage of preservation, and the described research fully confirms this assumption.