



**GISBIM**

INTERNATIONAL  
SUMMER SCHOOL

# Lectures and notes for a digital integrated design

MARCO CASINI  
FLAVIO ROSA  
SOFIA AGOSTINELLI  
STEFANO AMISTA  
SIMONE DI BIASE  
TOMMASO EMLER  
PATRICK MAURELLI  
CLAUDIO MIRARCHI  
ELISA PENNACCHIA  
FRANCESCO RUPERTO  
XING SHI  
CLAUDIO TOMAZZOLI





# GISBIM

INTERNATIONAL  
SUMMER SCHOOL

## Organized by

CENTRO DI RICERCA  
INTERDISCIPLINARE TERRITORIO  
EDILIZIA RESTAURO AMBIENTE CITERA



SAPIENZA  
UNIVERSITÀ DI ROMA

DIPARTIMENTO DI PIANIFICAZIONE DESIGN  
TECNOLOGIA DELL'ARCHITETTURA



SAPIENZA  
UNIVERSITÀ DI ROMA

## International partner



## Supported by



INTERNATIONAL URBAN COOPERATION  
European Union-Asia  
国际城镇合作项目: 欧盟 - 亚洲



A European Union  
Programme  
欧盟项目

**Rome 31 august - 11 September 2020**



# Acknowledgments

---

A special thanks for the continuous and constructive support goes to all the people who made possible the realization of this book and all the other activities connected to them:

- The European Union with Alexandra Lehmann from the FPI, as well as Rudolf Niessler, Ramón Lopez and Ronald Hall from DG REGIO.
- The IUC Asia team with Pablo Gándara, Qian Wang, Jin Jingnan, Oscar Prat, Roxana Jensen and Raul Daussa.
- The Interdepartmental Research Centre for Territory, Architecture, Heritage and Environment (CITERA) with Fabrizio Cumo
- The Department of Planning, Design, and Technology of Architecture at Sapienza University of with Laura Ricci

A warm thank you to Mrs. Baige Zhao 12th Foreign Affairs Committee of the NPC PRC Vice Chairwoman for having supported enthusiastically since early stage the promotion of ISS GIS-BIM in China.



# CONTENTS

---

## Foreword

PABLO GANDARA 7

## Preface

PROF. MARCO CASINI 9

## Why a digital integrated design?

Prof. FLAVIO ROSA 11

## List of contributors

INTRODUCTION 13

## BIM-GIS integration towards Digital Twin: shaping smart for rethinking cities

PROF. SOFIA AGOSTINELLI, ELISA PENNACCHIA 17

## BIM

### Organization and digitization of information on buildings and civil engineering works, including building information modelling (BIM)

PROF. FRANCESCO RUPERTO 23

### Common data environment(s) and digital platforms in the construction sector

DR. CLAUDIO MIRARCHI 33

### Integrated management of sustainable processes of requalification and recovery in the architectural and environmental heritage.

PROF. TOMMASO EMLER 37

### Digital Innovation in the project and construction phases

DR. STEFANO AMISTA 53

### 4D/5D modeling & management workflows at Cortina's Fis Alpine World Ski championships' new downhill race track

DR. SIMONE DI BIASE 71

### Basic theories of performance and optimization design of green buildings and cities

Prof. Xing Shi 83

## GIS

### Geographic Information Systems and their integration with BIM methodologies

ENG. PATRICK MAURELLI 99

## DIGITAL TWIN AND MACHINE LEARNING

### Digital methods and tools in the construction process for efficient project management workflows: case histories

PROF. SOFIA AGOSTINELLI 133

### Machine Learning: digital methods and tools

PROF. CLAUDIO TOMAZZOLI 153

## CONCLUSIONS

### ISS GIS-BIM: beyond summer school

PROF. FLAVIO ROSA 187

### Concluding remarks

189

## Organized by

---

DIPARTIMENTO DI PIANIFICAZIONE DESIGN  
TECNOLOGIA DELL'ARCHITETTURA



**SAPIENZA**  
UNIVERSITÀ DI ROMA

## Supported by

---



INTERNATIONAL URBAN COOPERATION  
European Union-Asia  
国际城镇合作项目: 欧盟 - 亚洲



A European Union  
Programme  
欧盟项目

## International partner

---



ISBN 979-12-200-7745-3



9 791220 077453