ISS GIS-BIM 2021 ACTIVITY PLAN AND TEACHING MODULES

SAPIENZA
UNIVERSITÀ DI ROMA

DIPARTIMENTO DI PIANIFICAZIONE DESIGN
TECNOLOGIA DELL'ARCHITETTURA

ACTIVITY PLAN

ISS GIS-BIM 2021 ACTIVITY PLAN AND TEACHING MODULES

- The ISS GIS-BIM 2021 has a duration of 40 hours divided into 5 modules.
- The theoretical lessons, lasting 32 hours in total, will be uploaded to the dedicated Moodle e-learning platform www.gis-bim.eu, to which subscribers can connect and follow the video contents recorded by the teachers according to your time schedule.
- For greater accessibility, the lessons provided in the individual modules are divided into mini videos lasting between 10 and 15 minutes.
- The total duration of each lesson is expected to be 50 min.
- There will be 6 hours of live activities with teachers who present case studies and answer the questions sent to them beforehand.

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- The last 2 hours of the ISS are dedicated to the final test consisting of 30 multiple choice quizzes, in live mode on the e-learning platform.

- To obtain the final certificate of attendance, it is necessary to correctly answer at least 18 out of 30 questions.

- To allow access to the ISS for students from all over the world with special requirements due to time zones, two specific days of live activities and examination sessions are planned.

- You can only participate in the final test once.

- Students must communicate the date of participation in the live activities and the final test when registering.

- The activity plan is shown below

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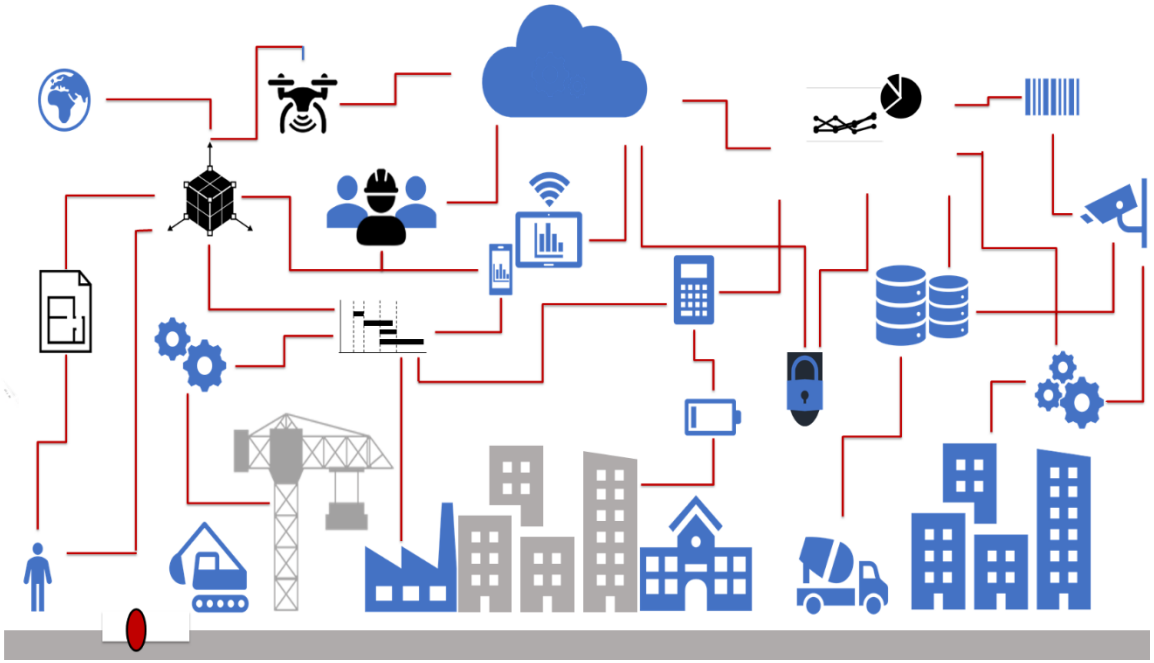
1a

An Introduction to Digital Transformation

1. The Digital Transformation of the Construction Industry. A choice of Industrial Policy. Definitions and Considerations from EUBIM Task group Handbook;
2. The strategic role of international standardization in BIM. Scenarios and Standards of the ISO standard 19650:2018.



Prof. Francesco Ruperto

Hours: 2 (2h video lessons)

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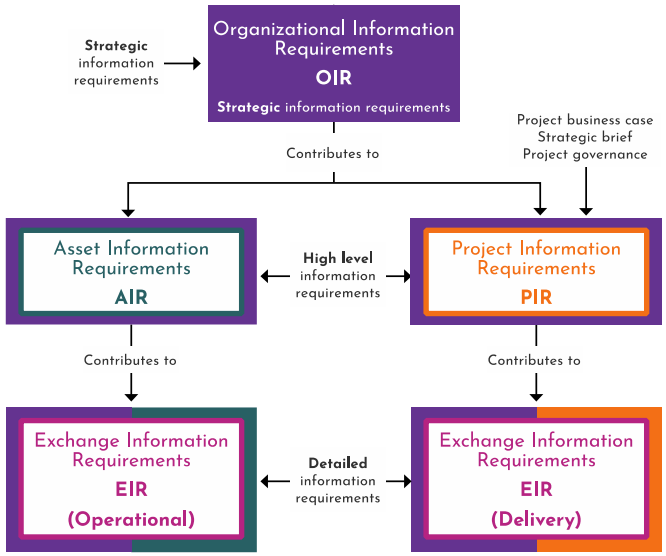
1b

BIM Terminology (BIM Dictionary)

- Overview on BIM Uses and their applications
- Level of Information Need
- BIM Execution Plan -theory and group exercise



Prof. Marzia Bolpagni

Hours: 6 (4h and 30 min. video lessons + 1 and 30 minutes Live activity)

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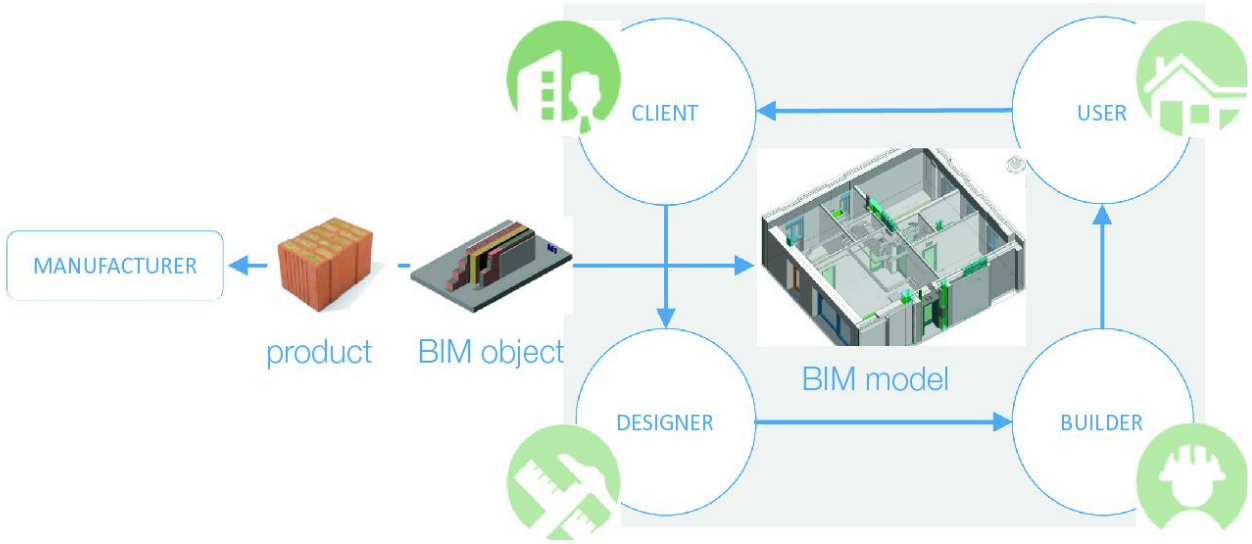
1c

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



Prof. Claudio Mirarchi

Hours: **1** (1h video lessons)

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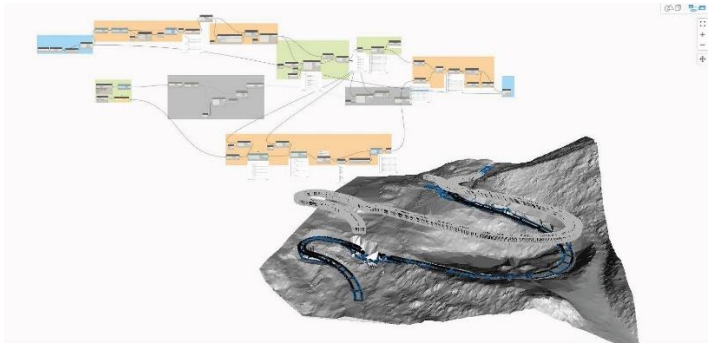
1d

4D/5D Modeling & Management workflows for Cortina's FIS Alpine World Ski Championships new downhill race track.



Prof. Simone Di Biase

Hours: **1** (1h video lessons)

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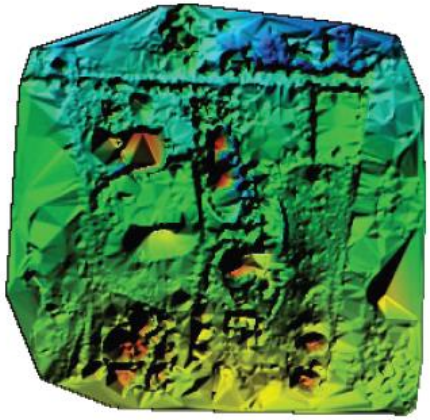
1e

Landscape design and Case studies

Starting from a quick analysis of some of the best design of the gardens of Italy - geometries and influences - the quick intro serves as a base to understand the process of the design of new landscape areas using Revit as interdisciplinary tool.

Case studies will be presented



Agronomist Mario Rossi

Hours: 2 (1h video lessons + 1 h Live activity)

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2a

The integrated management of sustainable processes of requalification and recovery in the architectural and environmental heritage. Purpose of the activity is to learn what are the methods and tools to investigate and learn about historical architecture and subsequently organize the data for different types of processing: on one hand the use of ICT to communicate historical and cultural heritage; on the other hand, the use of HBIM to preserve and reuse existing buildings and areas.

Prof. Tommaso Empler

Hours: 4 (3h and 30 min video lessons + 30 minutes Live activity)

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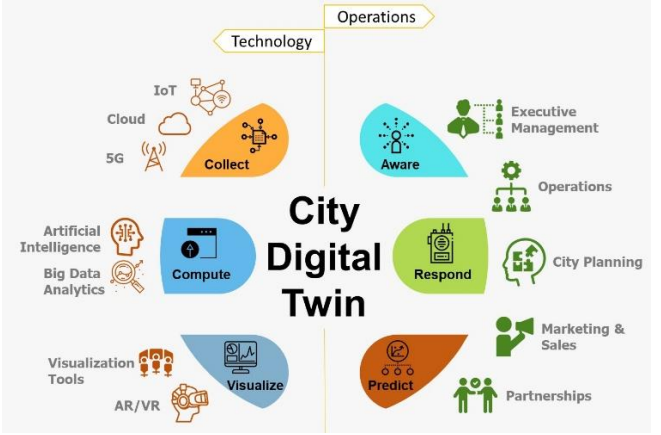
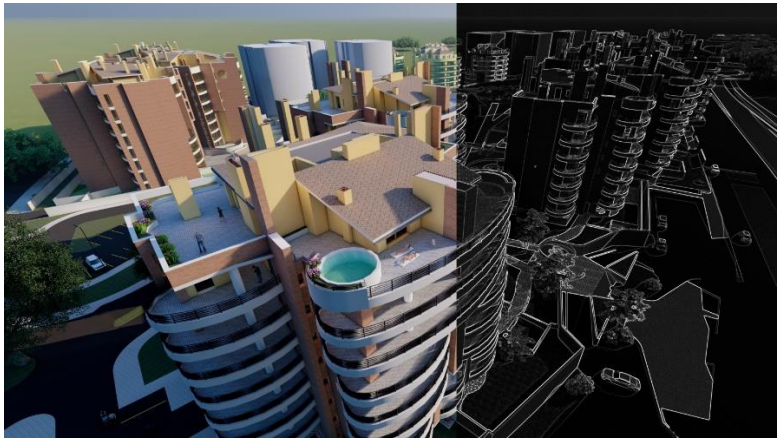
2b

Digital methods and tools in the construction process for an efficient project management workflow: case histories.

The activity provides an analysis of methods and applications related to the use of digital methods and tools for the control and optimization of different phases in the construction process.

The opportunities deriving from the integration of information systems in the project workflow will be explored also through the analysis of specific thematic case studies about the interaction of Digital Twins & Artificial Intelligence systems aimed at optimizing processes





Arch. Sofia Agostinelli

Hours: **4** (4 h video lessons)

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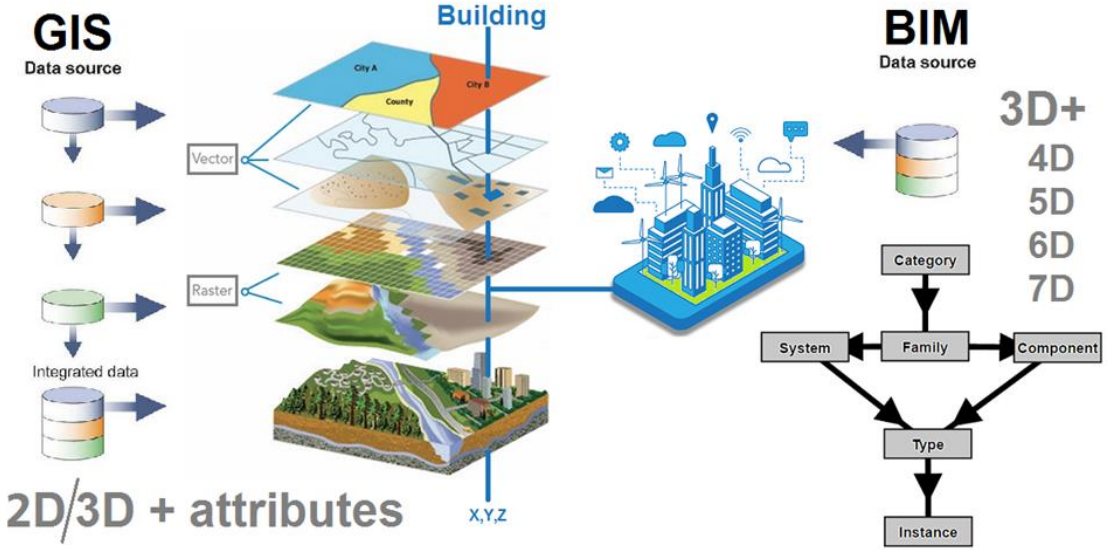
3

Geographic Information Systems and its integration with BIM methodologies. Why to integrate GIS with the BIM methodologies, tools and procedures? Beyond the 3D modelling: geography and GIS multi-thematic environment, additional dimensions of BIM data.



City Information Models (CIM) to build and manage sceneries of the Smart City; Digital Twins and Big Data for cities and territories. Some GIS-BIM applications: complex asset management; design and maintenance process for linear infrastructures; tri-dimensional cadastre. Introduction to GIS, to relational DBMS, to Geo-Data; relations among concepts as Scale, Informative details and domains, LOD; Attributes and classifications from thematic overlay to BIM categories.

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Some operations in GIS-BIM integrated environment:

- BIM feeding GIS Data through aggregation and summarize;
- GIS feeding BIM for new buildings context aware data.

Which models for GIS and BIM interoperability; 3D modelling in GIS environment; Cartographic models in BIM environment; Standardization of data structures and interchange formats: sharing and integrated management of spatial data through the Common Data Environment (CDE).

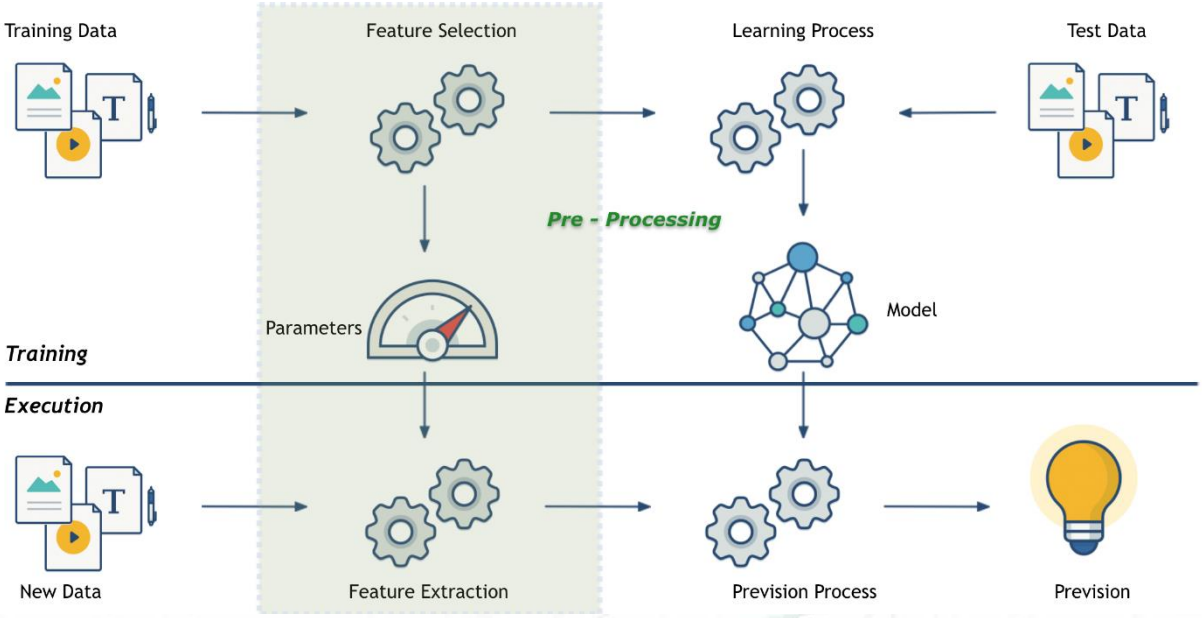
Ing. Patrick Maurelli

Hours: 6 (5h video lessons + 1h Live activity)

MODULE

4a

Digital methods and tools in the construction process for an efficient project management workflow: case histories. The activity provides an analysis of methods and applications related to the use of digital methods and tools for the control and optimization of different phases in the construction process.



The opportunities deriving from the integration of information systems in the project workflow will be explored also through the analysis of specific thematic case studies about the interaction of Digital Twins & Artificial Intelligence systems aimed at optimizing processes.

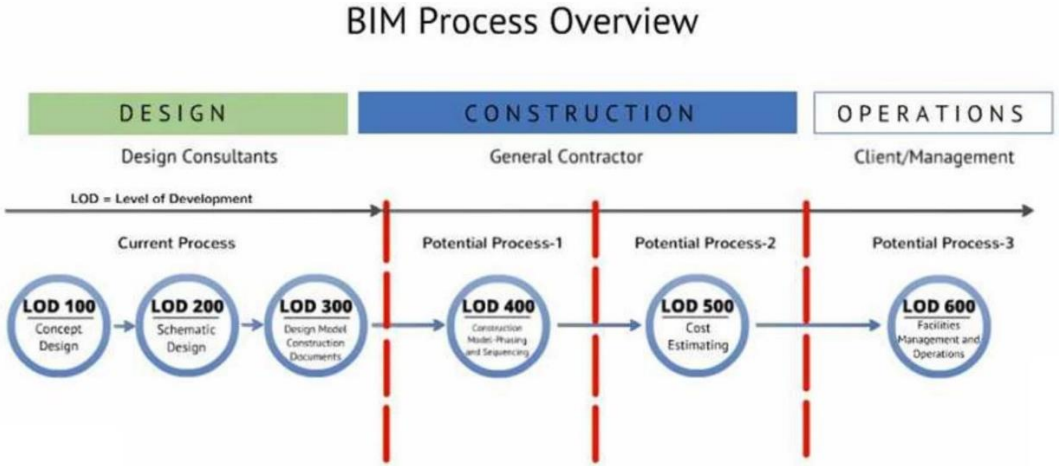
Prof. Claudio Tomazzoli

Hours: 2 (1h and 30 minutes video lessons + 30 minutes Live activity)

MODULE

4b

Analysis of integrated models and applicative case studies within the digital approach for planning and programming the activities through the process phases. The activity explores the theoretical and applicative aspects of an integrated 4D/5D project planning coming from the analysis of a 3D model, then proceeding to the realization of a 5D model up to the different levels of a 4D programming. The approach also involves the description of different planning techniques both in the design and construction phases.



Prof. Stefano AMISTA

Hours: 4 (4h video lessons)

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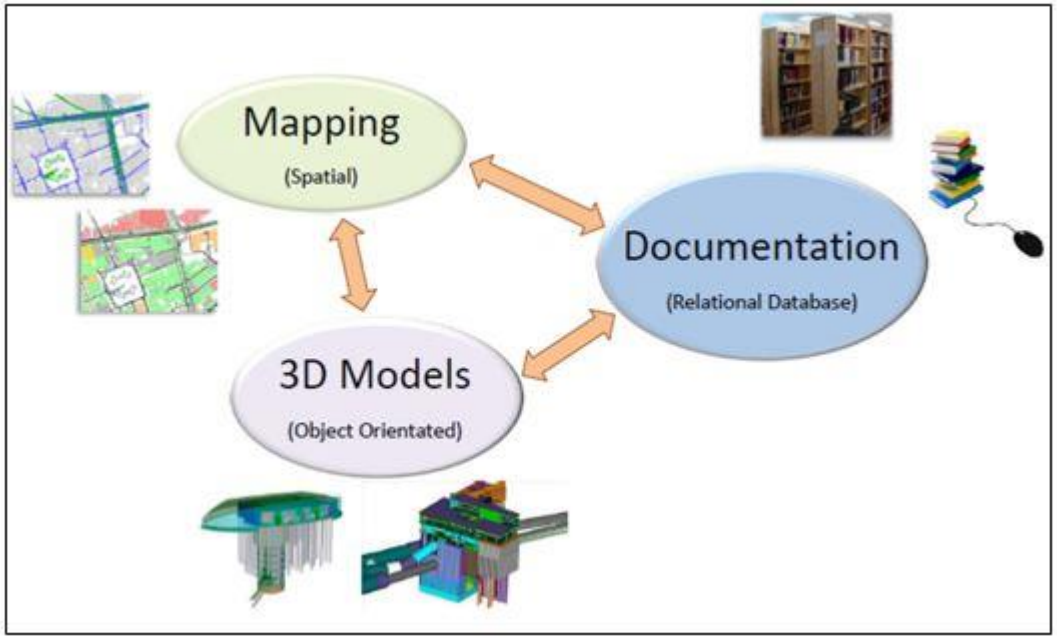
MODULE

4c
Data Collection (Survey and GIS) – Information Modeling (3D Modelling)
Building Understanding (Collaboration and Information Exchange /Visualisation)
Decision Making

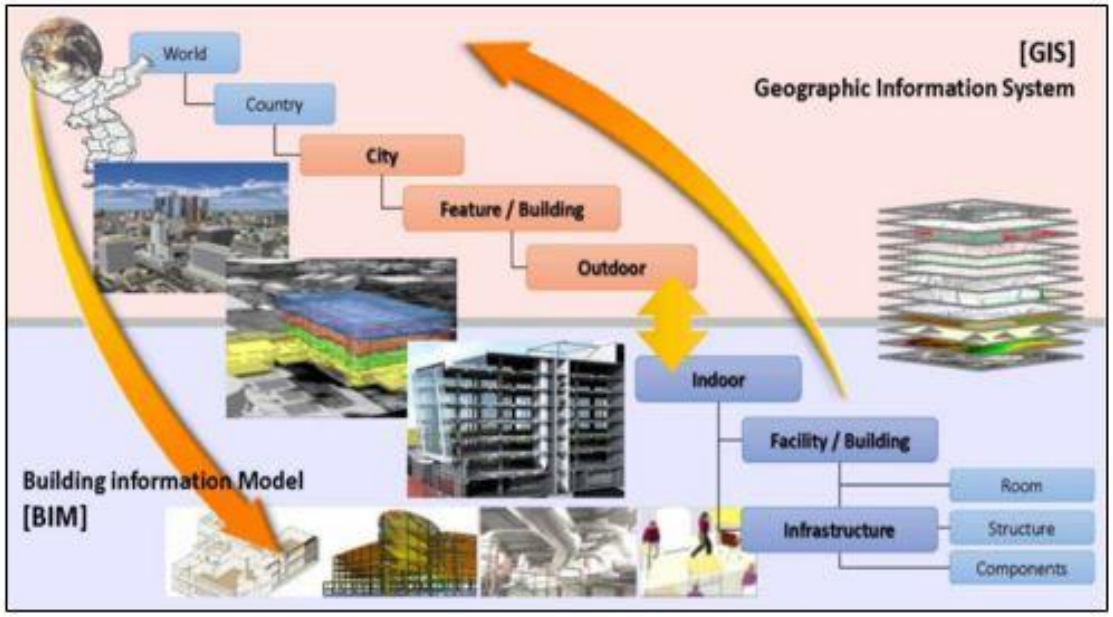


Prof. Georgios Kapogiannis The University of Nottingham Ningbo China

Hours: 2 (2h video lessons)

MODULE

4d
Design and Modelling as well as the importance of manufacturing contribution (Asset Information Modelling and GIS), from a Business and Project perspective



Prof. Georgios Kapogiannis The University of Nottingham Ningbo China

Hours: 4 (3h video lessons + 1 h Live activity)

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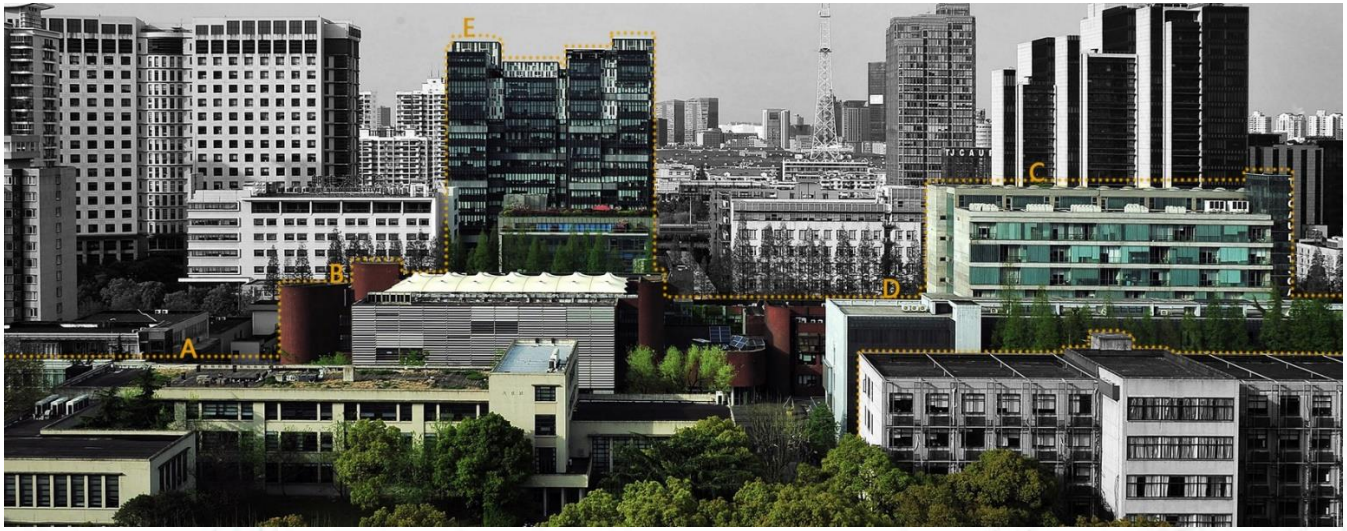
MODULE

4e

The Digital Transformation of the Construction Industry in ASIA-CHINA



Prof. Xing Shi, College of Architecture and Urban Planning, Tongji University

Hours: 2 (1h and 30 minutes video lessons + 30 min Live activity)

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MODULE

5

Final test

Prof. Fabrizio Cumo

Hours: 2 h live

Individual learning check

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Module 1	GIS and BIM: Digital Transformation of the Construction Industry		Total hours	Hours of live activity
1a	The Digital Transformation of the Construction Industry. A choice of Industrial Policy. Definitions and Considerations from EUBIM Task group Handbook;	**Prof. Francesco Ruperto**	2	
	The strategic role of international standardization in BIM. Scenarios and Standards of the ISO standard 19650:2018.			
1b	BIM Terminology (BIM Dictionary)	**Dr. Marzia Bolpagni**	6	
	Overview on BIM Uses and their applications			
	Level of Information Need			
	BIM Execution Plan -theory and group exercise **LIVE ACTIVITY**			1 h 1/2
	BIM Execution Plan -theory and group exercise **LIVE ACTIVITY**			
1c	Common Data Environment digital platforms in construction sector	**Prof. Claudio Mirarchi**	1	
1d	4D/5D Modeling & Management workflows	**Prof. Simone Di Biase**	1	
1e	Landscape design and Case studies Starting from a quick analysis of some of the best design of the gardens of Italy - geometries and influences - the quick intro serves as a base to understand the process of the design of new landscape areas using Revit as interdisciplinary tool. Case studies are Rome gardens and the IHE 2021 in China.	**Mario Rossi Ambientstudio**	2	
	LIVE ACTIVITY			1
Module 2	**Historic building information modelling (HBIM)**			

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2a	The integrated management of sustainable processes of requalification and recovery in the architectural and environmental heritage. Purpose of the activity is to learn what are the methods and tools to investigate and learn about historical architecture and subsequently organize the data for different types of processing: on one hand the use of ICT to communicate historical and cultural heritage; on the other hand, the use of HBIM to preserve and reuse existing buildings and areas.	**Prof. Tommaso Empler**	4	
	LIVE ACTIVITY			1/2 h
2b	Digital methods and tools in the construction process for an efficient project management workflow: case histories of digital Twins for **Residential design solutions**	**Sofia Agostinelli**	2	
Module 3	**GIS-BIM Theory and practice**			
3a	Geographic Information Systems and its integration with BIM methodologies. Why to integrate GIS with the BIM methodologies, tools and procedures? Beyond the 3D modelling: geography and GIS multi-thematic environment, additional dimensions of BIM data.	**Ing. Patrick Maurelli**	6	
	LIVE ACTIVITY			1
Module 4	**GIS and BIM case Histories**			
4a	Digital methods and tools in the construction process for an efficient project management workflow: case histories. Interaction of Digital Twins & Artificial Intelligence systems aimed at optimizing processes	**Prof. Claudio Tomazzoli**	2	
	LIVE ACTIVITY			1/2 h

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4b	Analysis of integrated models and applicative case studies within the digital approach for planning and programming the activities through the process phases. The activity explores the theoretical and applicative aspects of an integrated 4D/5D project planning coming from the analysis of a 3D model, then proceding to the realization of a 5D model up to the different levels of a 4D programming. The approach also involves the description of different planning techniques both in the design and construction phases. Digital methods and tools in the construction process for an efficient project management workflow: case histories. Theoretical and applicative aspects of an integrated 4D/5D project planning	**Stefano Amista**	4	
4c	Data Collection (Survey and GIS) – Information Modeling (3D Modelling) Building Understanding (Collaboration and Information Exchange /Visualisation) Decision Making	**Prof Georgios Kapogiannis**	2	
4d	Design and Modelling as well as the importance of manufacturing contribution (Asset Information Modelling and GIS), from a Business and Project perspective	**Prof Georgios Kapogiannis**	4	
	LIVE ACTIVITY			1
4e	The Digital Transformation of the Construction Industry in ASIA-CHINA	**Prof. Xing Shi**	2	
	LIVE ACTIVITY			1/2 h
	Final test		**2h**	

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Sapienza Professors responsible for the teachings and their short curricula

Prof. Fabrizio Cumo
Scientific director
Nuclear Engineer (degree 110/110 con lode in 1992)
Since 1999 confirmed researcher in Applied Physic Architettura Valle Giulia – University of Rome "La Sapienza"
Since 2007 professor in Applied Physic Architettura Valle Giulia – University of Rome "La Sapienza
Director of the research center CITERA – Sapienza University
President of the degree course in Project Management -Sapienza University
Director of the Master BIM (Building Integrated Modelling)- Sapienza University
2010-2014 Director of the Project Management Master
Since 2002 operates in the Institute of the Valorisation and Restoration of Cultural Heritage of Italian CNR (ICVBC) – section of Rome “Marcello Paribeni”
Leader of the research group for the evaluation of safety, security and environmental comfort for operators and work of art (CNR ICVBC) in 22 museums of Lazio region(2004), in 7 public library in Rome (2003) and in 13 churcs of the IXth Mountain Community of the Lazio region (2002)
2006 member of the Italian IPPC Commission for the Italian Ministry of Environment
2004 : member of the Italian Commission for the receiving of EU Directive 2002/91/CE for the Ministry of Environment for the responsible use of energy in residential area and the use of renewable sources.
2010-2013 Italian Scientific responsible for the research center CITERA of the project Source - Sustainable Urban Cells - European bilateral research program Italy-kingdom of Sweden on behalf of the General Directorate of the Ministry of Education Research Internationalization
2013-2015 Communication Manager of the ENPI-MED Project “GreatMED”

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2015-2017 Italian Scientific responsible for the research center CITERA of the project PRACTICE on the relvance of built environment on ageing society - European bilateral research program Italy-kingdom of Sweden on behalf of the General Directorate of the Ministry of Education Research Internationalization
Is author of more than 180 papers regarding the fields of energetic, environmental applied physic (IAQ, heat transfer and lightning) and sustainable buildings

Prof. Flavio Rosa Coordinator
Graduated in Environmental Engineering and Land Management at the Faculty of Engineering of La Sapienza Rome. He is a qualified engineer and is registered with the province of Rome. PhD in Energy at the Department of Nuclear Engineering and Energy Conversions (DINCE) with a thesis on the use of Biomass in protected natural areas. Research fellow: A.A. 2010/11 Study and Evaluation of Environmental Problems Related to the Maritime Transport of Dangerous Goods; AA.AA. 2011/12 2012/13 Implementation of Renewable Energy Within Port Areas. Adjunct Professor of Environmental Technical Physics at the Faculty of Architecture in Rome from 2014 to the present. Professor of 1st level BIM University Master - Building Information Modelling Faculty of Architecture Sapienza Rome and 1st level Master of Building Process Management - Project Management. Theses tutor and supervisor in the field of RES and their interaction with the built environment at the Faculty of Architecture at La Sapienza Rome. Reviewer of scientific articles in the field of sustainable architecture and systems integration in historic buildings. Author of publications in the field of renewable energy and energy retrofit within historic buildings. In charge of international relations for the SAPIENZA CITERA CENTER. International Summer School Coordinator with operations in China, Panama and Costa Rica.

Prof. Francesco Ruperto
Master's Degree in Architecture at Sapienza University of Rome, PhD in Representation and Survey of Architecture and Environment at University Gabriele D'Annunzio of Pescara. He coordinates the BIM Professional Higher Education Course and 3D Modeling&BIM Workshop at the Faculty of Architecture of Sapienza University of Rome.

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He is the coordinator of GL5 UNI/CT033/SC05 standard UNI 11337, OpenCortina Project Manager and expert member of the Commission DM 560/2017.

Prof. Tommaso Empler

BA Certificate of Higher Education in Architecture at Sapienza University of Rome in 1992. He obtaines PhD degree in 1998 and becomes research worker in 2010. Since 1998, as external lecturer, he teaches Computer Graphics at “Valle Giulia” Architecture Department of Sapienza University of Rome. From 2002 to 2004, as external lecturer, teaches Simulation techniques of landscape, at “Valle Giulia” Architecture Department of Sapienza University of Rome. From 2005 to 2010, as external lecturer, teaches Computer Graphics at the Faculty of Engineering of Trento. Since 2010 he is Assistant Professor at the Department of History, Design and Architecture Restoration teaching Computer Graphics 1, Computer Graphics 2, Atelier of Computer Graphics 3, Three-dimensional representation and dedicates it’s studies and research activity on: how using and developing computer graphics to design and survey with particular attention to Open Source systems; studying wayfinding systems related to visual and non-visual perception. He is author of many scientific book on his research field.

Prof. Patrick Maurelli

PhD in Urban Planning Techniques in 2009, is Coordinator of the GIS BIM & Digital Twin Laboratory of the CITERA Research Centre - Sapienza University of Rome; Responsible for European Projects and International Initiatives of FEDERESCO; H2020 Expert Evaluator for EASME EU Commission. Former EU projects and Energy Expert at the Infrastructures and Public Works Councilor Office of Roma Capitale. Project Manager for ongoing H2020 funded projects in the energy efficiency sector: REFINE (CSA – E7 AT Lead) activities of Federesco, for PLATOON (IA – Engie FR Lead) activities of Risorse per Roma. Civil Environmental Engineer expert in project management, energy efficiency and auditing, renewable energy, information technology (GIS, DBMS, WebGIS, BIM), impact assessment, LCA/LCIA, evaluation techniques. As GIS expert has been researcher at INRETS (France) on Transportation Urban

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planning and Safety themes, at CesdRoma/ISTAT within international statistic activities (EUROSTAT) and is author of various publications. Lecturer and tutor within the master's degree courses in Environmental Engineering for Sustainable Development (Sapienza University, 2005-2016). Technical supervisor of the “Land and Urban Planning Laboratory” and "GIS and Numerical Modelling Laboratory" of the Environmental Engineering Faculty (Sapienza). From 2002 as program and project manager participates in many R&D projects (Sapienza, ISPESL, INAIL, Ecomedia), engineering projects (large RES plants; hydraulics and wastewater treatment), GIS and multimedia development projects.

Prof. Sofia Agostinelli

Master’s Degree in Building Systems Engineering at Sapienza University of Rome, she is an Adjunct Professor of Project Management at the Faculty of Architecture of Sapienza University of Rome. She is involved in research activities at CITERA (Interdepartmental Research Centre for Building Territory Restoration Environment) participating in national and international work teams. She has authored several publications on the field of Digital Twin, digital project management and sustainability of construction processes.

Module 4a: Digital methods and tools in the construction process for an efficient project management workflow: case histories. The activity provides an analysis of methods and applications related to the use of digital methods and tools for the control and optimization of different phases in the construction process.

The opportunities deriving from the integration of information systems in the project workflow will be explored also through the analysis of specific thematic case studies about the interaction of Digital Twins & Artificial Intelligence systems aimed at optimizing processes.

Prof. Claudio Tomazzoli

Master’s Degree in Information and Automation Engineering at the University of Padova. PhD in Computer Science at the University of Verona. He is Adjunct Professor at the Department of Computer Science of the University of

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Verona and he is involved in research activities in the field of Artificial Intelligence. He is inventor of patents including Energy Management System in at least one building and relative method.

Prof. Stefano Amista

Graduated in Business and Economics and specialized in Project Management for construction, he has been working for the last 20 years in STR - TeamSystem Group in different positions, gaining specific skills in the fields of Customer Care, Software Solutions Development and Marketing, and he is currently Sales Specialist for AEC and BIM companies. He has been an Adjunct Professor in the Management Control Lab at the University of Turin since 2017, graduating with a master's degree in Accounting Professions.

Dr. Simone Di Biase

Simone Di Biase in an Architect with experience in complex building, infrastructure and TLC (mobile fixed and Data Center) projects, from preliminary design to construction phase. He joined DBA PRO. more then 10 years ago in 2007 involved in Real Estate projects and then in TLC sector. Since 2015 he is involved in BIM development for the Holding (DBA Group), as for develop BIM Projects and internal procedure for BIM development for Architecture, Infrastructure and TLC Business Unit. Due to his experience in complex projects and BIM procedure since 2018 is involved in BSI International as representative for DBA Group. With the experience acquired in standard projects and BIM Project the next step of research is to have a concrete approach to project development to the whole life cycle design and finally to facility management from BIM Models.

Prof. Claudio Mirarchi

Claudio Mirarchi is a postdoc researcher at Politecnico di Milano. He has a PhD in Building Engineering achieved at Politecnico di Milano and his research is focused on the introduction of digital processes in the construction sector with specific reference to the issues related to the knowledge management area. Founding partner of ConITeng s.r.l.

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an engineering company focused on innovative services in the construction sector, he is active in the research and practice about the implementation of BIM and digital processes and technologies in the construction sector. He is the project management work package leader of the DigiPLACE project aimed at creating the foundations for the future European platform(s) in the construction sector; he coordinates the development of the Italian standard about common data environment in the context of the UNI 11337 series (working group 4). He has held several courses and speeches at national and international level including the BIMA+ European master, the MSc Building Information Modelling program at the School of Architecture, University of Liverpool, the dissemination activities promoted by the Italian association of construction companies (ANCE) at Italian level, the LC3 conference, the ECPPM conference, the EC3 conference, the BIM world Paris, etc.

Prof. Marzia Bolpagni

Marzia Bolpagni, works as Head of BIM international at Mace where she develops and implements digital construction solutions for public and private international clients. She is glad to be a member of the BIM Excellence Initiative, Assistant Editor of the BIM Dictionary where she coordinates more than 120 volunteers worldwide, Ambassador of the UK BIM Alliance and Expert at the European Committee for Standardisation (CEN) TC 442 where she chairs a Task Group on information requirements standardisation (Level of Information Need). She is lead author of the standard EN 17412-1, Honorary Lecturer at UCL and Chair of EC3 Modelling and Standards Committee. She is also founder of Italians in Digital Transformation Uk, she loves sharing her knowledge with students and she is often invited as keynote speaker at academic and industrial events. She received several awards for her activities including ‘Woman Ingenious’ in 2017 and Star Award for Innovation and Service Excellence by Mace in 2019.

Prof. Georgios Kapogiannis

Georgios is recognized as a world leading expert and researcher in Digital Innovation in Architecture, Engineering and Construction sector. He held roles in Greece, United Kingdom, China and Middle East. He is a BRE BIM Certified ISO19650 Trainer and currently is working as a Director of the MSc Geospatial Engineering Assistant

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Professor in Building Information Modelling (BIM) at The University of Nottingham Ningbo China. He is also an Associate Member of the Center for Structural Engineering and Informatics at The University of Nottingham UK campus. In addition, He is the BIM Theme Leader and deputy head of the Geospatial and Hazard Research Group at the same university. His PhD is in Construction and Project Management from the University of Salford (UK) and is a member of the peer review college of the Economic and Social Research Council (ESRC) since 2015 (after invitation). Further to this, he served as the Chairman for the Chartered Institute of Building (CIOB) for Coventry and Warwickshire, committee member of the West Midlands branch between 2013 and 2015. Also, Georgios was a co – founder and member of the UK BIM Alliance – BIM Region East between 2016 and 2108. Currently he is a core member of the Digital Construction Working Group of the Chartered Institute of Building in the UK representing China and also member of China Technology Entrepreneurship Association - Committee Smart Construction Group in the Ministry of Science and Technology (MoST). Furthermore, Georgios has international experience in Digital Construction and Innovation (worldwide recognized) and he focuses in Industry 4.0. His research contributes towards the digitalisation transformation and enhancement of the collaborative culture in the Architecture, Engineering and Construction industry by integrating people, process and technologies. Notably most common technologies he uses: City Modelling and Building Information Modelling and Management, Artificial Intelligence, Gamification (Series Games), Unified Modelling Language including Business Process Modelling Language (UML - BPML), Mobile Technologies (Wireless, 5G, Optical, Satellite),HoloLens, Internet of Things (IoT), Simulation, Virtual Reality - Augmented Reality, Big Data and Blockchain.

Dr. Mario Rossi - ASLA - SER - UGC - EU licensed, chartered, certified.

Mario is an expert with a master degree in forestry sciences with studies in environmental economics and has led multiple design efforts. His background is unique as a practitioner in what has been called "agritecture" in an equilibrated mix between environmental sciences, sustainable architecture, (LEED based), landscape architecture, urban forestry, natural restoration with many years of experience in studies, researches, always with efficient creative

ACTIVITY PLAN

thinking. He is a professional in the sustainable design sector, with many successful experiences in ecological & landscape restoration, planning, with a profound knowledge of sustainable landscape architecture/design, history, botany, pedology, erosion control and storm water management, aerial photogrammetry and mapping for integrating field work with design. He has worked as Design Director, Principal Landscape Architect and Natural/Urban Planner for master plans, environmental impact assessment and projects in Italy, the Middle East and USA.
In the past Dr. Rossi had the honor of teaching, training and mentoring college students from Architecture, Agriculture, Ecology, Forestry, Planning and Urban design Faculties at Florence University, in Italy; at the New York Bronx Botanical Garden, Horticulture School, USA
He regularly hosts interns at his Studio in Dubai, UAE.

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Start of lessons: **26/7/2021**

32 h THEORIC LESSON	Available on Moodle e-learning platform from 26 July 2021
6 h LIVE ACTIVITIES	Moodle e-learning platform
1st session	30 August 2021
2nd session	23 September 2021
2 h FINAL TEST	Moodle e-learning platform
1st session	31 August 2021
2nd session	24 September 2021

Delivery language: **English**

Assigned CFU: **6 ECTS-CFU**

Frequency modes of educational activities: **The attendance of at least 75% of the activities entitles the student to a certificate of attendance.**

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E-learning platform: Moodle

Stage: **unscheduled**

Registration fee: **500 € + 16 taxes**

Any partial or total exemption fees from the payment of the Department's portion of the fee expressed as a percentage. 40 % discount for Ph D students Sapienza

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Timetable

		Start lessons					End of lessons
	Hours	First session			Second session		
Availability on-line lessons on MOODLE platform	32	26 july 2021					24 sep 2021
Live actvities	6		30 Aug 2021			23 Sep 2021	
Final test	2			31 Aug 2021			24 Sep 2021

GISBIM INTERNATIONAL SUMMER SCHOOL

Dipartimento di Pianificazione Design Tecnologia dell'Architettura
Sapienza Università di Roma

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- Simone Di Biase - DBA PRO
- Prof. Claudio Mirarchi - Common Data Environment(s) and Digital Platform in Construction Sector
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SAPIENZA
UNIVERSITÀ DI ROMA

DIPARTIMENTO DI PIANIFICAZIONE DESIGN
TECNOLOGIA DELL'ARCHITETTURA

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