CoVHer

Computer-based Visualization of Architectural Cultural Heritage

Supporting digital capabilities of the higher education sector and stimulating innovative learning and teaching practices

We want to support digital capabilities for the higher education sector and stimulate innovative learning and teaching practices. The main objective is to define applicative guidelines and operational methodologies aimed at the study, the implementation, the visualization, the accessibility and the critical evaluation for 3D models of artefacts that no longer exist or never have been built, in accordance with the Charter on the Preservation of Digital Heritage (UNESCO, 2003) and the FAIR data principles (2016). The aim is to define a clear methodology for the creation and documentation of Computer-based Visualisations of Architectural Cultural Heritage.

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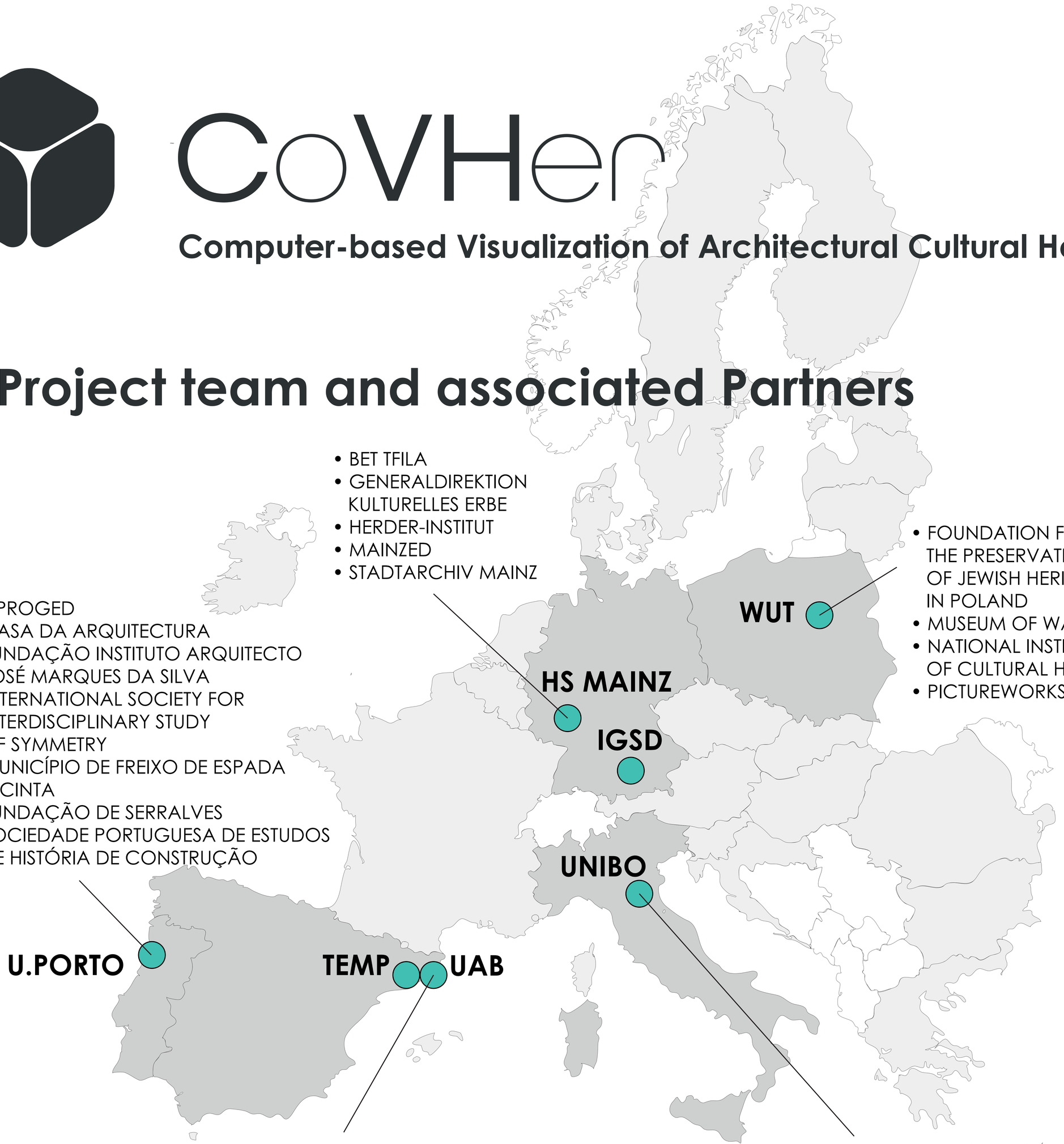
Computer-based Visualization of Architectural Cultural Heritage

Project team and associated Partners



- BET TFILA
- GENERALDIREKTION KULTURELLES ERBE
- HERDER-INSTITUT
- MAINZED
- STADTARCHIV MAINZ

- FOUNDATION FOR THE PRESERVATION OF JEWISH HERITAGE IN POLAND
- MUSEUM OF WARSAW
- NATIONAL INSTITUTE OF CULTURAL HERITAGE
- PICTUREWORKS

- APROGED
- CASA DA ARQUITECTURA
- FUNDAÇÃO INSTITUTO ARQUITECTO JOSÉ MARQUES DA SILVA
- INTERNATIONAL SOCIETY FOR INTERDISCIPLINARY STUDY OF SYMMETRY
- MUNICÍPIO DE FREIXO DE ESPADA À CINTA
- FUNDAÇÃO DE SERRALVES
- SOCIEDADE PORTUGUESA DE ESTUDOS DE HISTÓRIA DE CONSTRUÇÃO

- AGÈNCIA CATALANA DEL PATRIMONI CULTURAL
- COMPUTER APPLICATIONS IN ARCHAEOLOGY INTERNATIONAL ASSOCIATION
- INSTITUT CATALÀ D`ARQUEOLOGIA CLÀSSICA
- SOCIEDAD ESPAÑOLA DE ARQUEOLOGíA VIRTUAL
- SOCIEDAD INTERNACIONAL DE HUMANIDADES DIGITALES HISPÁNICAS
- UNIVERSITAT POMPEU FABRA

- COMUNE DI CESENA
- MUSEO LEONARDIANO DI VINCI
- REGIONE EMILIA-ROMAGNA

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HS Mainz



Jan Lutteroth



Piotr Kuroczyński



Tara Jalili

Mainz University of Applied Sciences
Institute of Architecture

Digital 3D reconstruction of masonry synagogues

The course offers students a practice-oriented introduction to a common CAD software for architects. The fundamentals of CAD as well as advanced principles of BIM methodology are thought with further applications oriented towards the building process. Using examples of partly lost sacred buildings from the Jewish cultural sphere in the area of East-Central Europe, the course offers students the opportunity of getting in touch with a foreign culture in a foreign country, while raising awareness for our shared cultural heritage on the basis of common ground principles.

Therefore, the students are confronted with the method of digital 3D reconstruction and are required to generate accessible, well documented and reusable 3D research data using online publishing tools and creative common licensing.

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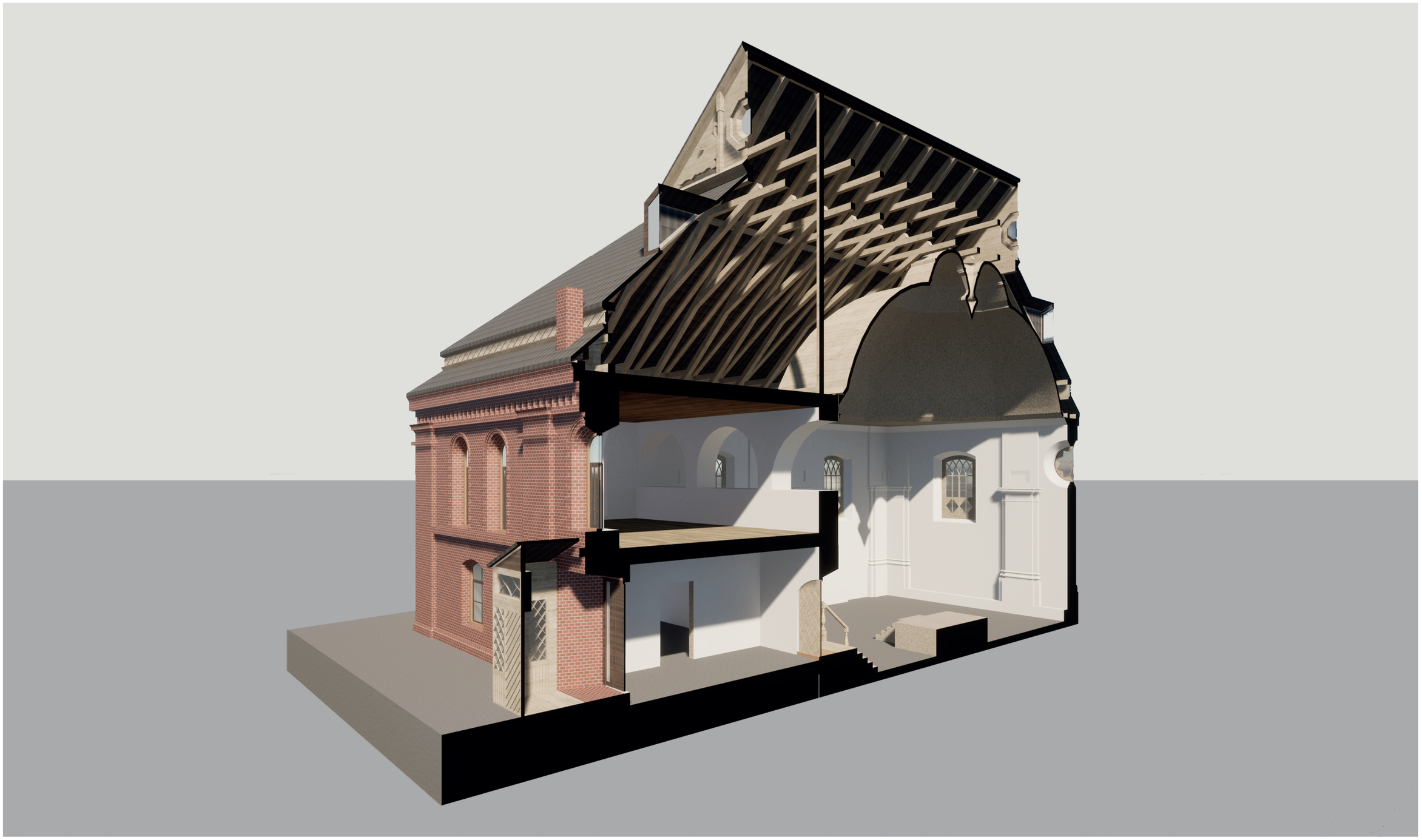
HS Mainz



Tara Jalili



Digital 3D reconstruction of the former synagogue in Oszmiana (Belarus)

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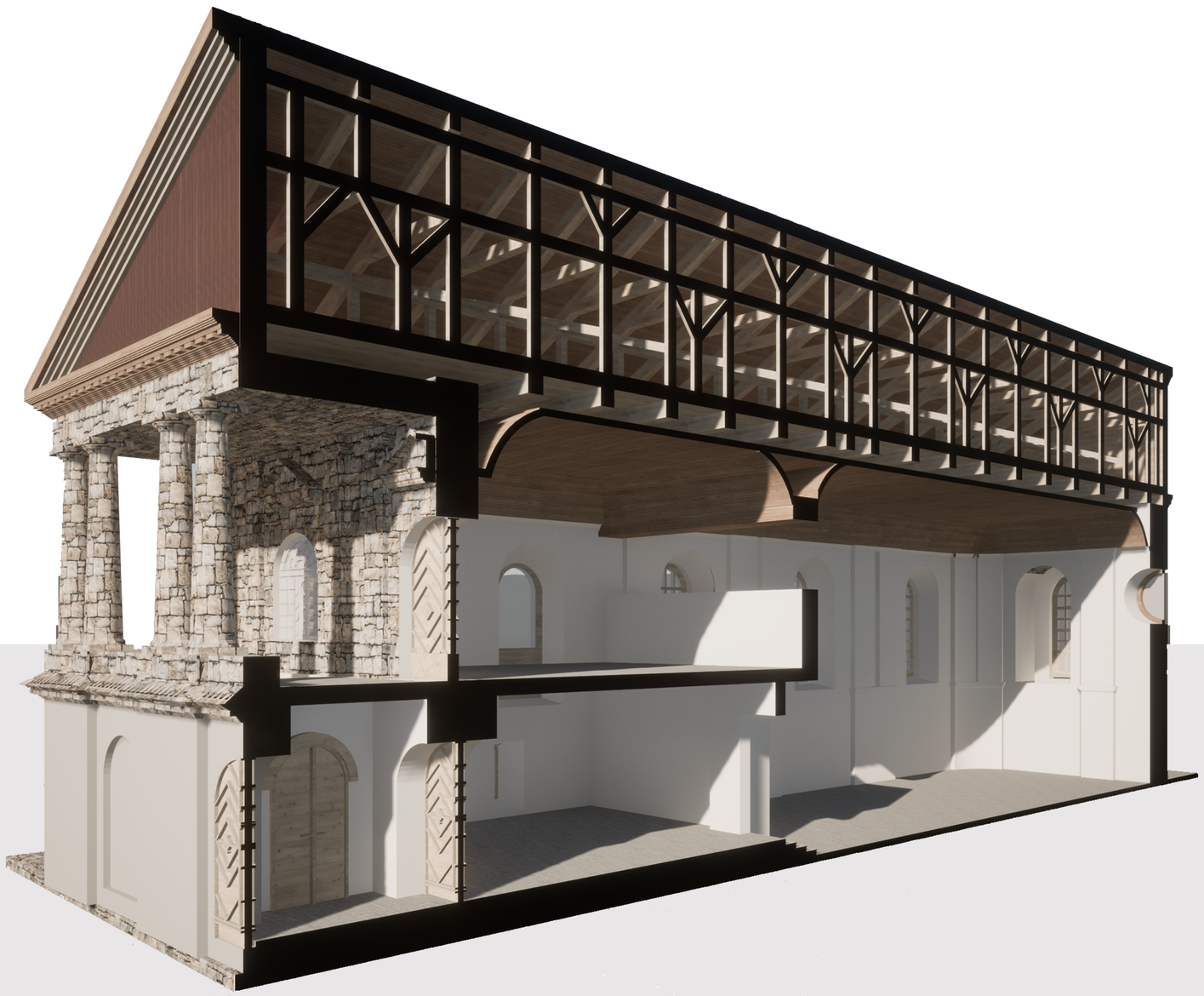
HS Mainz



Jana Arning



Carla Flohr



Digital 3D reconstruction of the former synagogue in Nowy Korczyn (Poland)

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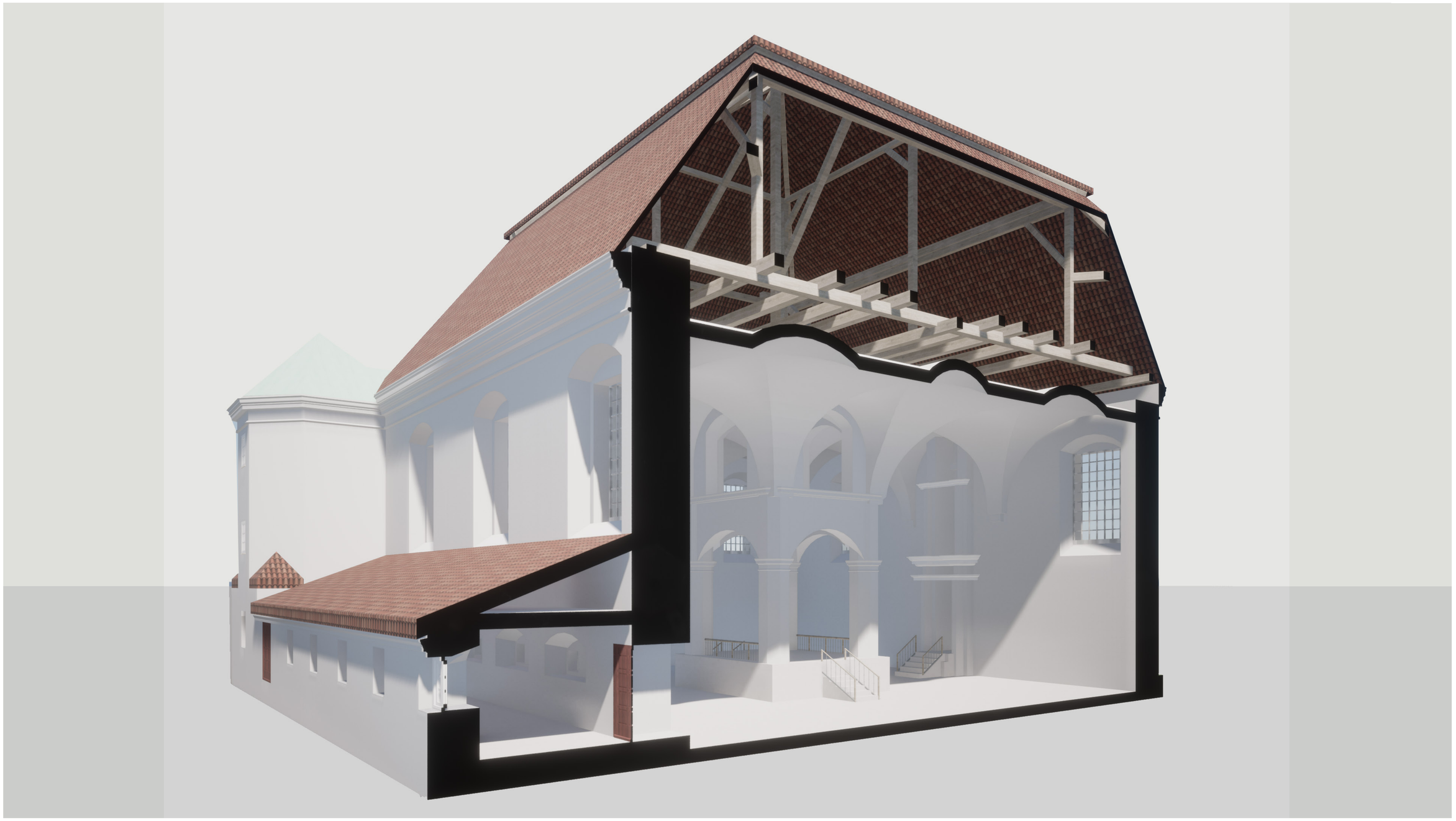
HS Mainz





Annelotte von Velsen **Sebastian Kleinhans**



Digital 3D reconstruction of the former synagogue in Tykocin (Poland)

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TUL







Piotr Kuroczyński **Igor Bajena** **Tomasz Grzelakowski**

Lodz University of Technology
Institute of Architecture and Urban Planning

Digital 3D reconstruction of wooden synagogues

In this course, students immerse themselves in the critical examination of historical sources and cultivate skills in 3D modeling using 2D representations as a foundation. The seminar revolves around the architectural legacy of wooden synagogues in the former Republic of Poland, which tragically vanished during the Second World War. By harnessing computer-aided research, the objective is to emphasize the immense value of digital 3D reconstruction as a powerful tool for research and dissemination. The ultimate aspiration is to meticulously document, effectively communicate, and widely share the lost cultural heritage with the scientific community, the general public, and creative industries alike. This will be accomplished through the creation of "Scientific Reference Models" and their derivatives, such as rapid-prototyping, augmented reality, and virtual reality applications. These innovative methodologies for transferring cultural heritage will be seamlessly integrated into teaching practices, enhancing educational experiences and nurturing a profound understanding of history, architecture, and digital technology.

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TUL





Julia Wiśniewska

Adam Miziołek



Digital 3D reconstruction of the synagogue in Mogielnica (Masovia, Poland)

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TUL



Michał Majchrzak



Miłosz Kazuła



Digital 3D reconstruction of Synagogue in Pilica (Poland)

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WUT







Krzysztof Koszewski **Jakub Franczuk** **Karol Argasiński**

Warsaw University of Technology
Faculty of Architecture

Information Processes in Architectural Heritage

The role of new information management techniques in protecting and transforming historical objects, complexes, and cities is growing. New tools used daily in the architect's workshop find application in this area. This work also requires a specific interdisciplinary dialogue between architects, historians, art historians, conservators, and IT specialists. A special role in the designing process is played by the study phase, consisting of collecting and adequately ordering information about the historical values of the object/objects, with particular emphasis on the detailed valorization carried out for the needs of a specific design task.

The project is based on Jakub Franczuk's archaeological research in the ancient Roman city of Mustis in Tunisia. We chose one of the temples as the object of virtual reconstruction. The work was divided among three teams, each focusing on a separate issue while working in an integrated environment. Students learned about methods of acquiring metric data, parametric and algorithmic heritage modeling, performing simulations, and ways of interactive visualization like Virtual Tour, VR, and AR.

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WUT



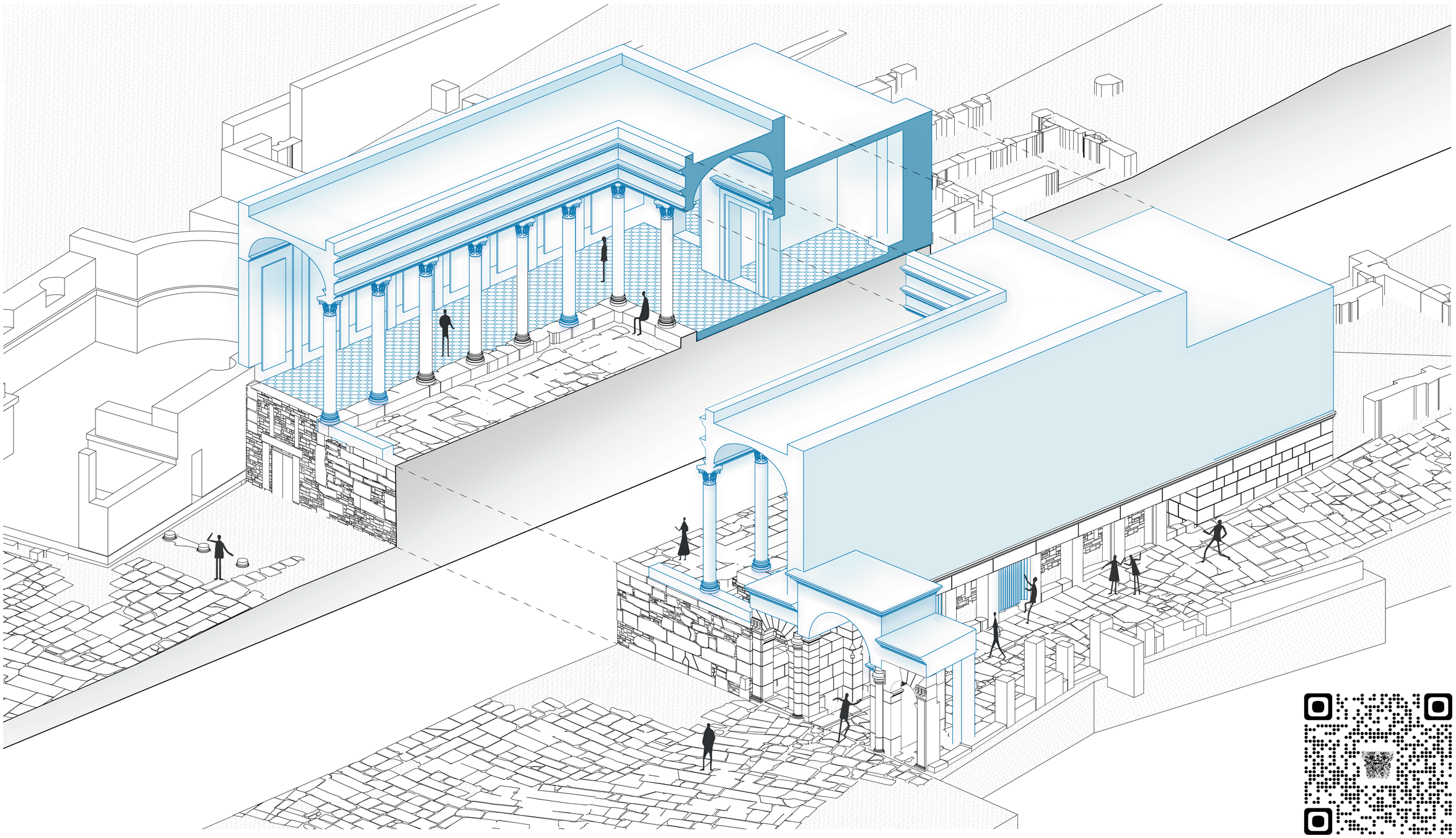
Ewa Loos



Anastasiia Makarevych



Joanna Tokarska



Partial digital 3D reconstruction of the Roman temple of Fortuna in Mustis (Tunisia)

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WUT



Katarzyna Prokopiuk



Digital 3D reconstruction of the Synagogue in Wolpa (Belarus)

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Juan A. Barceló Evdoxia Tzerpou Jan Salazar Gironès

Universitat Autònoma de Barcelona

Department de Prehistòria. Quantitative Archaeology lab
UAB-OpenLab. Digital Lab.

Digital Humanities and Digital Heritage (Official master's degree). In collaboration with Universitat Pompeu Fabra

This master's degree provides graduate students from any branch of humanities, heritage and cultural studies with theoretical and practical training in the development of new technologies for digitizing cultural heritage materials.

This 600 hours course makes emphasis on:

- Programing Heritage Information Systems
- Computer Visualization – including photogrammetry and 3D scanning
- Human-Computer Interaction

All those computational methods are applied to the reconstruction of historical, artistic and cultural materials and to the design of Virtual Museums and other forms of advanced digital dissemination of cultural knowledge.

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UAB



Joan Ibáñez Juncosa



Jan Salazar Gironès



Digital 3D reconstruction of an celtiberian hut at the castro of Santa Tecla, Galicia (Spain)

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UAB



Jan Salazar Gironès



Jon Iker Escondrillas



Evdoxia Tzerpou



Digital 3D reconstruction of a hut from the Neolithic site of La Draga, Catalonia (Spain)

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UAB





Galder Sassiain

Suren Vazquez



Digital 3D reconstruction of a unique building in the village of Castellet de Banyoles, Catalonia (Spain)

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U.PORTO







João Pedro Xavier Clara Pimenta do Vale Hugo Pires

University of Porto, Faculty of Architecture
Center for Studies in Architecture and Urbanism

Integrated Master's in Architecture, Advanced Course in Architectural Heritage, Doctoral Program in Architecture

Representation tools, such as sketching, hand drawing, physical models, and virtual models, are crucial elements in the teaching and learning process in the Faculty of Architecture (FAUP) and are typically used in combination or alone.

Although there is not a course or curricular unit on 3D virtual reconstruction at FAUP, in several of the curricular units (CU), in master dissertations, in advanced courses, in doctoral theses, and also in research projects that include students and alumni in teams, 3D scanning, 3D modelling, and 3D virtual reconstruction have been used with a significant increase over time.

The work done in Construction CU can be mentioned as an example where 3D modelling is used to understand and communicate execution modes of certain buildings in the History of Portuguese Architecture CU. Here physical and virtual models are used to reconstitute a building in a certain period of time. In some research projects with student participation, the models are also used either for didactics, structural analysis or communication to the general public.

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U.PORTO



Camila Esturilho



Gabriela Biscotto



Afonso Silva



Cristina Tasso



Digital 3D reconstruction of the former City Hall Building and D. Pedro Square in 1892, Porto (Portugal)

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UNIBO







Fabrizio I. Apollonio **Federico Fallavollita** **Riccardo Foschi**

Alma Mater Studiorum, University of Bologna
Departmet of Architecture

Architectural Drawing and Graphic Analysis (2nd year)

In this course, the students learn how to analyse, deconstruct, and represent the complexity of architectural models through the use of 3D digital representation methods. They build a hypothetical 3D architectural model starting from documental graphical sources by authors of the past (e.g., C. N. Ledoux, A. Palladio, M. Guidi, G. A. Antolini, etc.). They learn the difference between representation methods and 3D modelling techniques and they are asked to apply them according to their needs and the context. They learn how to deal with classical orders, historical units of measurement, architecture modularity, documental inconsistencies and incomplete primary sources.

They are taught to document and communicate the hypothetical reconstruction process transparently and objectively, with a particular focus on the visual communication of uncertainties through the use of false colours. Another important aspect of the course is the visualization of the 3D models through the educated choice of the point of view and the projection type. In the end, they learn how to present their work through printed posters by applying all the good practices of traditional technical drawing.

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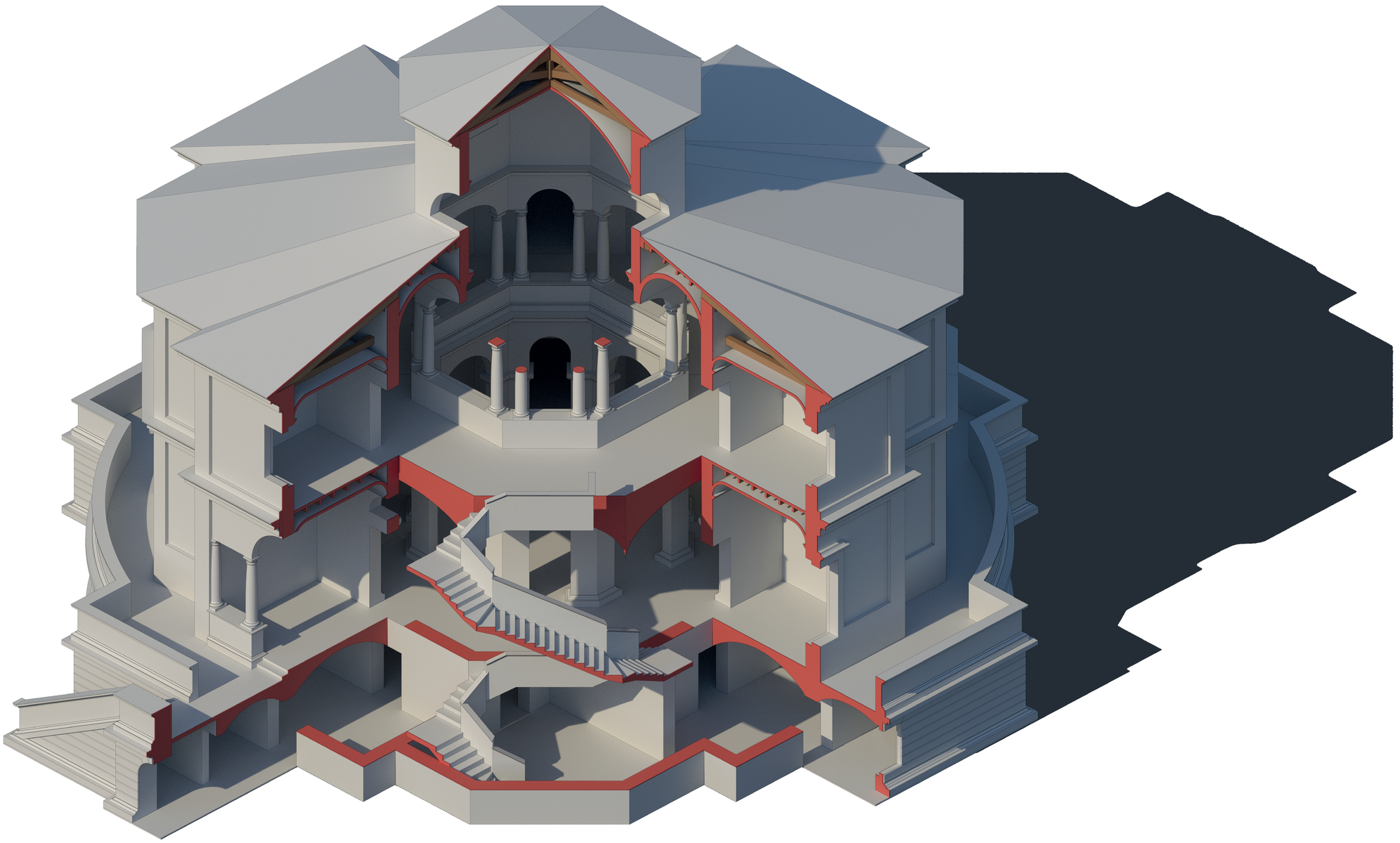
UNIBO



Matilde Barchi



Sofia Capelli



Digital 3D reconstruction of an isolated palace for a nobleman designed by Mauro Guidi

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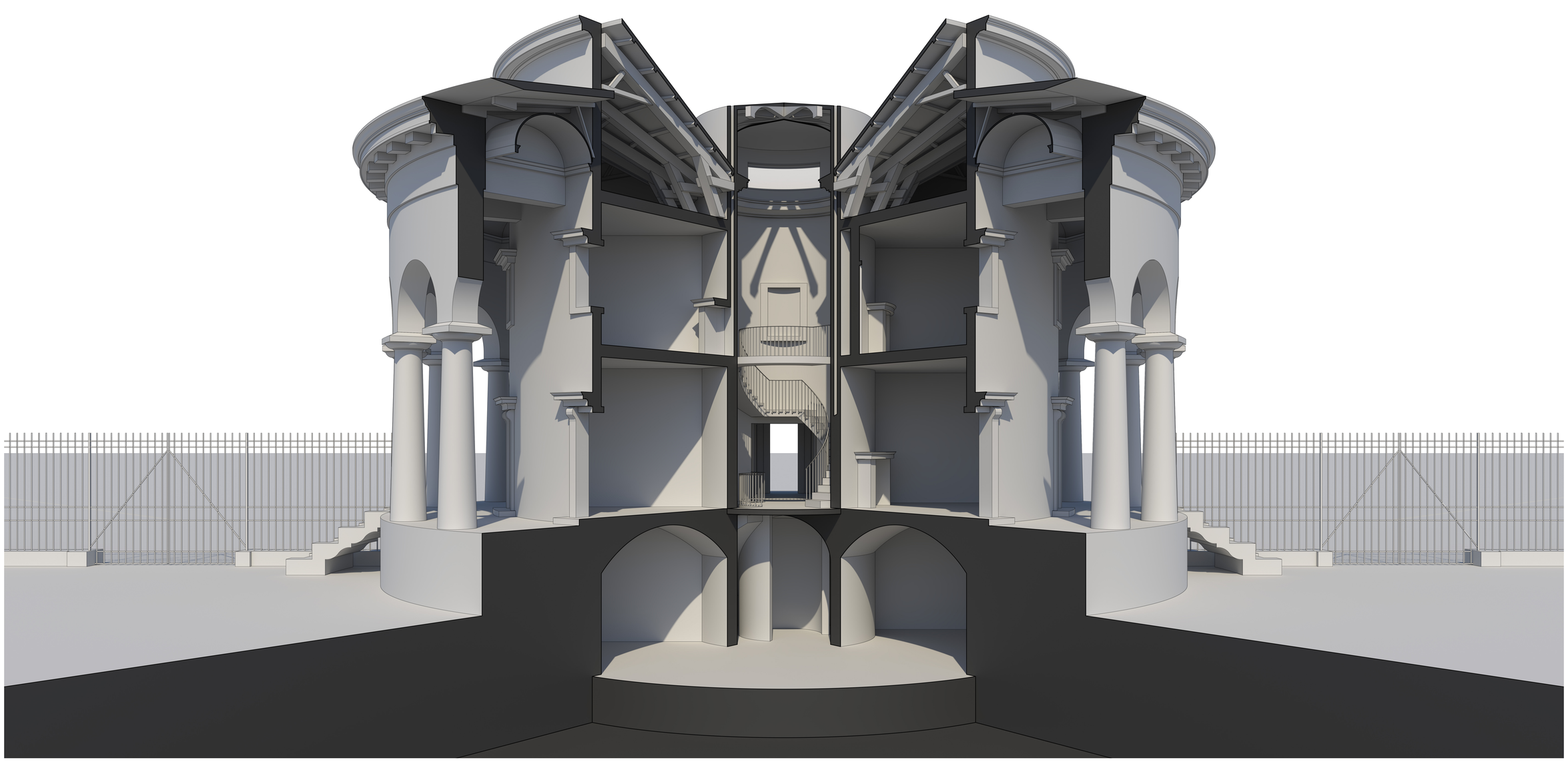
UNIBO



Joshua Flenghi



Lucia Lacchini



Digital 3D reconstruction of "Barrière de Reuilly" designed by Claude-Nicolas Ledoux, Paris (France)

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UNIBO



Asia Zecchini



Florida Bajramaj



Digital 3D Reconstruction of the “Church of Beata Vergine detta della Vena” designed by Mauro Guidi, Cesena (Italy)

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