

# ARCHITECTURAL HERITAGE

## CRT/DAD/Consorzio delle Residenze Reali Sabaude - 3D Heritage and Digital Twins for Preventive and Planned Conservation of the Reggia di Venaria Reale

<b>Funded By</b>	CONSORZIO DELLE RESIDENZE REALI SABAUDE [P.iva/CF:09903230010] FONDAZIONE CRT CASSA DI RISPARMIO DI TORINO [P.iva/CF:06655250014] Dipartimento DAD
<b>Supervisor</b>	CHIABRANDO FILIBERTO - filiberto.chiabrand@polito.it
<b>Contact</b>	03527 NARETTO MONICA
<b>Context of the research activity</b>	<p>The research aims to investigate, develop and discuss 3D models of the architectural heritage for knowledge management and conservation activities. The research unfolds in geomatics and architectural restoration and will incorporate both disciplines' vocabulary and state of the art, combining them for process innovation to preserve monumental architectural heritage. 3D models representing the best interoperable solution will be treated and determined to represent complex material realities and manage digital collections, maintenance strategies and conservation plans concerning the preservation and use of historical architecture.</p>
	<p>The research aims to investigate, refine and discuss - with reference to the state of the art and current innovations - three-dimensional representation models of the architectural heritage with the specific aim of knowledge management throughout the entire span of conservation activities. The research, therefore, unravels in the field of geomatics and restoration and will make the lexicon, the state-of-the-art and current innovations of both disciplines, its own, consciously combining them for process innovation in the field of the preservation of the architectural heritage, and in particular of the monumental heritage. 3D models representing the best interoperable solution will be treated and determined to represent stratified and complex material realities and to manage digital collections, maintenance strategies and conservation plans of historical architectures, as well as their content and the needs of preservation and use.</p> <p>The study of Heritage is conducted from the perspective of current territorial and global challenges regarding innovation and digitisation processes connected to updated European protocols and programmes and to the 'Piano Nazionale della Ricerca 2020-2027'.</p> <p>The research case study, developed over three years, will be part of the activities envisaged by a project whose partners include the Politecnico di Torino, the Consorzio delle Residenze Reali Sabaude Venaria Reale and the</p>

## Objectives

Centro Conservazione e Restauro, and will tackle the creation of a Digital Twin of the Reggia of Venaria Reale starting from existing multiscale and multisensor data and/or acquired with modern 3D metric survey techniques such as mobile and fixed laser scanning systems and digital terrestrial and drone Photogrammetry. Artificial Intelligence techniques will also be tested and used to classify, improve the quality of, and fill in the gaps in the models.

The model generated will constitute the 3D geometric basis on which an intelligent system will be set up, useful for connecting, in an interoperable format, the knowledge, data and information relating to restorations and activities documented and carried out over the years on the Reggia. It is envisaged that the tool developed at the end of the three years of research will support the development of integrated preventive and planned conservation actions for rational and innovative management of the functions of study, prevention, maintenance/conservation, restoration and valorisation, also through the development of protocols for predictive maintenance. This strategy, therefore, envisages, in the wake of the culture of preventive and planned conservation, the systematisation of the available knowledge data and the creation of digital collections linked to the model of the monumental complex, also populated by information derived from diagnostics, monitoring and work carried out on the property, as well as periodically updated inspection sheets.

The model will be calibrated to the point where it will be sustainable to digitally describe and manage knowledge and maintenance/conservation processes over time, and the research will refer to the state of the art, case studies and best practices, as well as to the evolution of experiments.

The PhD grant involves collaborating with the Consorzio delle Residenze Reali Sabaude Venaria Reale, which co-finances the research. During the three years of work, the PhD student will be required to be connected constantly with PoliTo Supervisors, with Consorzio delle Residenze Reali Sabaude Venaria Reale, in order to develop studies and applications by the best agreement between the subjects for highly qualified scientific research and an adequate correspondence with the objectives set and updated along the way.

Methodologies and reference scenarios will also be perfected through research periods abroad, at universities and in research centres that develop these topics.

## Skills and competencies for the development of the activity

The candidate must have competence in 3D survey techniques, architectural 3D modelling digital visualization applied to historical architecture, including potential and possible applications in Cultural Heritage. A basic knowledge in Artificial Intelligence is also considered an important value.

He/she must know the preservation and conservation problems of the architectural heritage and be able to interpret them to determine conservation plans.

He/she must be able to read and interpret historical sources of various natures (documentary, iconographic, bibliographic) written in Italian and English.