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Scientific report

Virtual Palaces, Part 1.
Digitizing and Modeling Palaces

Summary

The workshop was held on the 18th-19th of November 2011 as part of the ESF Research Networking Programme PALATIUM: "Court Residences as Places of Exchange in Late Medieval and Early Modern Europe (1400–1700)". It was attended by several scholars and researchers from the whole Europe and the US from different disciplines such as architecture – especially history of architecture – survey and archaeology.
The workshop focused on the digital model as a research tool for the study and analysis of European palaces, with particular attention on the creation of 3D models to show the different construction phases of the buildings.
The event, titled "Virtual Palaces, Part 1. Digitizing and Modeling Palaces", was hosted by Krista de Jonge in the Castle of Arenberg, Leuven. I was selected as a grantee to show the provisional results of a work in progress that concerns the study and creation of a 3D model of the Tribuna of Palazzo Grimani in Venice.

Description of the scientific content of and discussion at the event

The workshop opened with an exhibition on two of the most modern tools used in surveying, Leica laser scanner and Coudere total station. The choice of these instruments was quite accurate, as the conference demonstrated that the laser scanner is still one of the most used tools in this kind of studies.
Subsequently, some students gave their final presentations on the results of the workshop that preceded this event. In fact, the Raymond Lemaire International Centre for Conservation organized a workshop for several students that had to survey and analyse a room of the Castle of Arenberg, where the event was set. The Architectural Heritage Documentation for Conservation Workshop (ARCHDOC) consisted of a 4 days fieldwork in which the students were split in five groups. Several professors from different nationalities and different disciplines followed each group, guiding the students to record, document and analyse the space and to prepare a final dossier, presented at the conference.

At the end of this prologue, Prof. Krista De Jonge, host of the event, opened the proper workshop with a welcome speech, after which she introduced the most important and impressive works among the ones presented at the workshop.
First, Ana Almagro Vidal presented the results of a several year project of study of the Islamic palaces of Al-Andalus: *Islamic palaces of Al-Andalus. A perceptive approach through virtual reconstruction*. Her work consisted in the creation of

realistic 3D models that represented the diachronic evolution of the palaces, adding some characteristics that helped perceiving the palaces as they were when they were built, such as decorative patterns, vegetation, lights and choreographed water features. Another presentation that followed the same path, although in another timescale and location, was *Integration on metric data with historical context at Arenberg Castle, Heverlee. Telling the story from the evidence of social, architectural and domestic functions revealed in the interpretation of 3D and 2D measured work by RLICC 2000-2011* by the same Krista De Jonge, with Bill Blake and Björn Van Genechten. Using historical documentations, drawings and map, together with modern techniques of surveying (laser scanner) and the recording provided by the students of the workshop, the team is carrying on a work in progress that aims to detect the different phases that led to the current layout of the castle. Particularly interesting was the identification of an irregularity in the alignment of the façade, consequence of the succession of the elements' construction. In fact, the two towers at the corners were built before the part that connects them, which, therefore, is not perfectly straight.

These two presentations collected the main points and the general topic of the entire workshop: using modern technologies to help the study and analysis of historic buildings and in particular using 3D visualization methods to help the understanding, fruition and perception of the different phases that often characterize the most important architectural artifacts.

After these opening sessions, the workshop moved towards the discussion of five case studies dealing with the validity of virtual models as research tools. These presentations focused on different epochs, timescales and disciplines. They showed various uses of the virtual model, as the final purpose of the model depends on the discipline it is used for. For this reason, 3D models where created for touristic purposes, to virtually reconstruct ramshackle buildings, to associate databases to their elements, as a base for preliminary studies and restoring interventions, and to better understand the construction techniques.
- Károly Magyar (*The changing ways of the visual and physical reconstruction: a case study on Buda Castle*) proposed a reconstruction hypothesis for a medieval royal palace at Buda (Budapest), excavated from 1948 after the flooding of the Danube.
- Richard Kurdiovsky and Herbert Wittine (*Re-building the Hofburg of Vienna*) created a 3D model the Hofburg in Vienna, through which they presented the architectural history of the palace from the Middle Ages to the 20th century. This model allowed them to check the reliability of the hypothesis that have been made on the different phases, but also to plan a possible "touristic" outcome like animated films or exhibitions.
- Anca Bratuleanu, Giovanni Mataloni and Stefano D'Avino (*Romanian court residences. The Potlogi Palace: history and virtual recording as restoration tools*) studied the Potlogi Palace, a court residence in Walachia (Romania), erected in 1698. They used the 3D model as a tool to help both the study of historic architecture and the intervention and restoration projects.
- Noémie Renaudin, Bertrand Rondot and Livio De Luca's work (*3D virtual reconstruction and visualization of the Petit Trianon in Versailles*) was slightly different, as they studied and reconstructed the furniture of the Petit Trianon in Versaille and put it on an online website. This project allows the people to virtually visit the room not only as it is nowadays, but also as it used to be in the past. Moreover, they attached a database to every element of the room that shows the point

cloud, the pictures, some documentary information and a 3D vision of the object.
- Daniela Oreni and Branka Cuca's project (*The vaults of Villa Reale in Monza: a three-dimensional virtual model for the accurate understanding of their genesis and construction techniques*) dealt with the creation of a 3D model of Villa Reale in Monza with the final purpose of supporting the conservation hypothesis for the future, for a constant maintenance of the complex. The scholars that worked on this project thought of an online output, for it to be seen and used by the general public.

During Saturday's late morning the workshop moved the attention towards the methodological problems involved in the use of this kind of technologies, with an interesting presentation by Rand Eppich (*New possibilities, an assessment and the future of three dimensional tools for capturing, modeling and documenting cultural heritage*) on the evolution of the recording techniques from the "ancient history" of the computer to the future possibilities that new technologies are leading to.
The following two presentations (David Lo Buglio and Livio De Luca, *Comparative study of the cognitive aspects contained in the 3D representation of cultural heritage: review of six technical and methodological approaches*; Belén Jimenez Fernandez-Palacios, *Importance of 3D models for studies and analyses of architectural structures*) focused on the comparison of the main recording techniques for architectonic artifacts. The general idea is that the researcher has to choose the technique that better applies to the singular purpose of the project and the characteristics of the object. Most of the times, though, it seems that the different techniques have to compensate each other, so they have to be used together.

The first session of Saturday afternoon was reserved to junior researchers.
- David Tingdahl and Luc Van Gool (*3D modelling of immovable heritage with ARC3D*) presented the software named ARC3D, through which it is possible to create accurate point clouds using only digital photographs.
- Miklós Rácz's ongoing project (*Digital modeling of the existing building remains as a basis of analysis and reconstruction in the case of the castle Csesznek, an early 15th-century country residence in Hungary*) consisted of the creation of a 3D model of the castle Csesznek, showing its evolution in time: the medieval fabric and the additions made in the early modern epoch and in the 20th century, trying to reconstruct the parts that are now lost.
- Inga Genytė (*Recovery aspects of the Castle Palace in the Baltic Sea Region*) proposed the creation of a 3D model of the Castle Palace in the Baltic Sea region as a preliminary tool for the restoration works.
As last of this session, I presented a 3D model of the Tribuna of Palazzo Grimani in Venice (Martina Ballarin *Digital technologies for knowledge: the 3D model of the Tribuna of Palazzo Grimani in Venice*).

The last session of the event dealt with the final uses of these tools, as often the 3D models are reproduced in two dimensions for books and articles and their final fruition is not well planned.
- Ignacio Arce (*Qasr al-Hallabat, Qusayr'Amra & Qastal. Three case studies of virtual reconstruction of palatine architecture between late antiquity and the early Islamic period*) studied the palatine complex of Qasr al Hallabat/Hammam as-Sarrah and created a 3D model of it from Late Antiquity till the advent of Islam, recreating its appearance throughout the ages.

- Hafizur Rahaman and Mizanur Rashid (*Revisiting the past through virtual reconstruction: The case of the Grand monuments of Paharpur, Bengal*) developed a virtual model of the lost complex of the Buddhist Monastery of Sompur Mahavihara at Paharpur, Bangladesh. The most interesting part of this project was that they created an online platform where people, both scholars and the general public, can leave a comment about the reconstruction hypothesis, give them feedback and contribute with their own ideas, information and private stories about the complex.
- João Neto, Maria Neto and Ricardo Silva (*Historic buildings through a multimedia experience. The example of a research project in the palaces of Sintra, Portugal*) are working on a project whose aim is to create accurate 3D models of the palaces of Sintra with the final purpose of creating multimedia applications for educational purposes. The particularity of this project is that they developed a set of interactive video games, through which the people can experience the palaces.

Assessment of the results and impact of the event on the future direction of the field

From the discussions in the different sessions several issues were identified as relevant to the topic.

- The interdisciplinary character of a project is fundamental to generate good results. Even the success of this event was made possible by the presence in the same place of art and architectural historians, engineers, surveyors, technicians and archaeologists that worked together at the projects and dialogued on the same topics, sharing knowledge.

- The 3D model is a very important tool that allows us to visualize, perceive and therefore improve our knowledge on historic buildings, especially because often they do not exist anymore in their original forms. The virtual model can be used as a preliminary study of a reconstruction process or completely replace it.

- New technologies help the cognitive process, but they cannot be used on their own. They need the support of methodologies, disciplines, and methods of representation already well established.

- It is important not just to know the final purpose of the project, but also to plan the dissemination initiatives directed towards the general public as well as the research community. This is important especially for the 3D models that often are created in a way that allows the people to perceive a complex that does not exist anymore.

Final programme of the meeting

FRIDAY 18 NOVEMBER
09.00 Registration (until 14.00)
PROLOGUE
10.00 3D scanning demonstration (Coudere and Leica Geosystems)
11.00 ArchDOC student presentations on architectural heritage documentation, Raymond Lemaire

International Centre for Conservation

12.30 Lunch break

OPENING OF THE WORKSHOP *VirtualPalaces,PartI*

14.00 Welcome by **Krista De Jonge**, PALATIUM Chair

14.10 Keynote: **Ana Almagro Vidal** (Historic Heritage Conservation Department, Fundación Caja Madrid): *Islamic palaces of Al-Andalus. A perceptive approach through virtual reconstruction*

Session I. Digitizing and Modelling the Castle of Arenberg

Chair: Mario Santana Quintero (K.U.Leuven)

14.50 Keynote: **Bill Blake** (ICOMOS UK), **Björn Van Genechten** (University College St. Lieven/ K.U.Leuven) & **Krista De Jonge** (K.U.Leuven): *The integration of metric data with historical context at Arenberg Castle, Heverlee. Telling the story from the evidence of social, architectural and domestic functions revealed in the interpretation of 3D and 2D measured work by RLICC 2000-2011*

15.50 Discussion

16.10 Coffee break

Session II. Virtual Models as Research Tools: Case Studies - I

Chair: Stephan Hoppe (Ludwig Maximilians Universität München)

16.40 **Károly Magyar** (Budapest History Museum): *The changing ways of the visual and physical reconstruction: a case study on Buda Castle*

17.20 **Richard Kurdiovsky** (Austrian Academy of Sciences) & Herbert Wittine (Vienna University of Technology): *Re-building the Hofburg of Vienna*

17.40 Discussion (until 18.00)

SATURDAY 19 NOVEMBER

Session III. Virtual Models as Research Tools: Case Studies – II

Chair: Krista De Jonge (K.U.Leuven)

09.00 **Anca Bratuleanu** (Ion Mincu University of Architecture and Urbanism, Bucharest), **Giovanni Mataloni** (G. d'Annunzio University of Chieti-Pescara) & **Stefano D'Avino** (G. d'Annunzio University of Chieti-Pescara): *Romanian court residences. The Potlogi Palace: history and virtual recording as restoration tools*

09.20 **Noémie Renaudin** (CNRS MAP/Gamsau, Marseille), **Bertrand Rondot** (Etablissement Public du musée et du domaine national de Versailles) & **Livio De Luca** (CNRS MAP/Gamsau, Marseille): *3D virtual reconstruction and visualization of the Petit Trianon in Versailles*

09.40 **Daniela Oreni** (Politecnico di Milano): *The vaults of Villa Reale in Monza: a three-dimensional virtual model for the accurate understanding of their genesis and construction techniques*

10.00 Discussion

10.20 Coffee break

Session IV. Technological, Methodological, and Theoretical Aspects

Chair: Bill Blake (ICOMOS UK)

10.50 Keynote: **Rand Eppich** (Tecnalia Research & Innovation): *New possibilities, an assessment and the future of three dimensional tools for capturing, modeling and documenting cultural heritage*

11.30 **David Lo Buglio** (CNRS MAP/Gamsau, Marseille) & **Livio De Luca** (CNRS MAP/Gamsau, Marseille): *Comparative study of the cognitive aspects contained in the 3D representation of cultural heritage: review of six technical and methodological approaches*

11.50 **Belén Jimenez Fernandez-Palacios** (Bruno Kessler Foundation, Trento): *Importance of 3D models for studies and analyses of architectural structures*

12.10 Discussion

12.30 Lunch break

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Session V. Poster Presentations

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Chair: Pieter Martens (K.U.Leuven)

14.00 **David Tingdahl** (K.U.Leuven) & **Luc Van Gool** (K.U.Leuven): *3D modelling of immovable heritage with ARC3D*

14.20 **Miklós Rácz** (Hungarian National Museum, National Center for Cultural Heritage): *Digital modeling of the existing building remains as a basis of analysis and reconstruction in the case of the castle Csesznek, an early 15th-century country residence in Hungary*

14.40 **Inga Genytė** (Vilnius Gediminas Technical University, Lithuania): *Recovery aspects of the Castle Palace in the Baltic Sea Region*

15.00 **Martina Ballarin** (Università IUAV di Venezia): *Digital technologies for knowledge: the 3D model of the Tribuna of Palazzo Grimani in Venice*

15.20 Coffee break

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Session VI. Virtual Reconstructions and their Uses

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Chair: Ana Almagro Vidal (Fundación Caja Madrid)

15.50 **Ignacio Arce** (Director Spanish Archaeological Mission to Jordan): *Qasr al-Hallabat, Qusayr'Amra & Qastal. Three case studies of virtual reconstruction of palatine architecture between late antiquity and the early Islamic period*

16.10 **Hafizur Rahaman** (National University of Singapore) & **Mizanur Rashid** (International Islamic University Malaysia): *Revisiting the past through virtual reconstruction: The case of the Grand monuments of Paharpur, Bengal*

16.30 **João Neto** (Instituto Superior Técnico, Lisbon), **Maria Neto** (History of Art Institute, University of Lisbon) & **Ricardo Silva** (Instituto Superior Técnico, Lisbon): *Historic buildings through a multimedia experience. The example of a research project in the palaces of Sintra, Portugal*

16.50 Discussion

17.20 Conclusions and introduction to Munich workshop *Virtual Palaces, Part II*

17.30 End