

Space and time visualization book

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Abstract. This contribution aims to present a recently finalized book on digital “Space and time visualization” of cultural heritage: buildings and landscapes. The book is currently in press (in July 2015) at Springer Netherlands.

Topics of the contributions include:

- Network analysis of heritage architecture
- Historic cartography investigation of lost landscapes
- Digital cartography
- Digital landscape architecture techniques
- GIS representations, including of natural hazards
- Computer aided priority setting of risk mitigation on cultural artefacts
- 3D modeling of historic sites affected by natural hazards
- Virtual reality robots
- Digital building survey
- Virtual architecture design studio
- Essays on digital archives and media architecture
- Review of digital art conservation

Authors are from 3 continents, including countries like USA, Sri Lanka, Italy, Switzerland, Greece, Germany, Romania.

Keywords: *digital methods, landscape, architecture history, natural hazards*

1. INTRODUCTION

NeDiMAH (Network for digital methods in arts and architecture) is a Research Networking Programme co-funded by the European Science Foundation in which the first author was steering committee member. The idea of the book (Bostenaru Dan and Crăciun, 2016) started with the NeDiMAH workshop (Bostenaru Dan, 2012) in Bucharest in 2012, but at the end contributors from all over the world were invited to present their ideas on “Space and time visualization”. Some of the experts abroad were involved as reviewers. This workshop reunited participants from two working groups of NeDiMAH, namely “Space and time” and “Information visualization” hence the title of the book. Since the 2012 NeDiMAH workshop in

Bucharest took place in the Centre for Architectural and Urban Studies, the introduction of the book presents the history and architecture of the building in which it functions and its today use as venue for research activities. The preface of the book is written by the secretary general of the centre.

The conclusions show the way research in Romania can be linked with research worldwide. They also offer a view of relevant past and future conferences, and of entrepreneurship programmes, thus laying out a perspective for future work.

Contributions in the book are based on cooperation with scientists from Karlsruhe, either featuring the approach in Germany, where digital humanities are much better represented and build a field of study. For example, Karlsruhe hosts a unique museum in the world for digital art (ZKM,

Centre for Art and Media), and this field was not so well represented in NeDiMAH as humanities. In this sense the book closes a gap. Architecture is also a part of art, since the home university in Romania, dedicated to architecture and urban planning, was classified as university of arts, and the book aims to underline the contribution of architecture, urban planning and landscape to humanities, either as architecture history or digital landscape. In a context in which virtual reality labs are created all over the world, analysing Karlsruhe gives an overview of their economic efficiency. Looking at the other institutions we observe that authors represent the state of the art in these fields in many parts of the world. Especially for urban planning, GIS is a field of interest, and limits and possibilities of its employment are identified. This served the postdoctoral project (Bostenaru Dan, 2015) of the first author which aims to go beyond GIS in working with maps. Except GIS, cartographic material is being considered for investigation of space and time in digital landscape, in the somewhat niche field of landscape history.

This year (2015) at the 300th anniversary of the city of Karlsruhe (Stadtmarketing Karlsruhe GmbH KA300, 2015) the mentioned Centre for Art and Media prepared a programme with a strong component of digital art (Globale). One of the contributions in the book (e-installation) will have an exhibition starting September 4th. We hope that the book will also be dedicated somehow to this anniversary.

2. STRUCTURE OF THE BOOK

The book is divided in 6 sections, to which the mentioned introduction on the framework of the project and some concluding remarks come. The first three sections deal with the fields covered by the book:

- Digital landscape
- Digital art history
- Digital art

The other three sections are dealing with thematic issues. Two of them are dedicated to visualization and the way the 3D real artifact comes into the virtual world, namely:

- Virtual reality
- Virtual recording

These two sections refer to two aspects covered when dealing with digital methods in architecture, urban planning, landscape architecture as arts in general. First for virtual preservation the building has to come into the computer, for which different virtual recording means are evaluated in papers, such as remote sensing and development of photogrammetric methods with of recorders which are different from laser scanning. The potential of Structure for Motion is shown. This is also the subject of the mentioned exhibition. Once reconstructed, based on reality or on information in the archives (similarly to what the landscape archives showed previously), the architectural, artistic or urban objects can be represented in virtual reality. Two essays in the section “digital art history” were dedicated to what archives mean for buildings and urbanity respectively, both drawing on experience of the authors with the virtual.

The last section is a special field, namely digital representation of hazards. This connects to the postdoc project on digital means for analysis and representation of the impact of hazards, and looks thus critically to GIS as alternative to other methods which consider the scale difference between urban scale and building scale.

3. SELECTED PAPERS

The second author authored a paper in the first section, on a project called “Lost gardens”, an overview of the cartographic representation of lost green spaces in Bucharest. This way the change of function over time from unconstructed to constructed space can be followed and mapped. The paper is well integrated within the section and the other works, particularly with the one on “Lost landscapes” which did a similar analysis for disappeared landscapes such as islands, forests, and cities across the whole of Romania.

The first author wrote two papers and a review. The review refers to a European project on “Digital art conservation”, to which a separate book volume was published two years ago. The project had as partner the mentioned museum of the Centre of Art and Media. The review is part of the section of Digital art along with a paper dealing with media architecture/media facades, presented at the

NeDiMAH workshop in Bucharest. The articles refer to the subject of disasters. One of them shows the perspective background for photogrammetric measurement and a Structure for Motion programming approach for recognizing the structure of a building on which it can be built when assessing its vulnerability in earthquakes, a more detailed method than Rapid Visual Screening (FEMA, 2015). This paper is included in the section of virtual recording, along with two papers dealing with GIS, one of them presenting the limits and possibilities while the other connects GIS to remote sensing in modeling of waterways in Sri Lanka. The other paper shows the detailed assessment of this vulnerability in three cases: employing a structural mechanics method called DBELA (Glaister and Pinho, 2003) (Borzi et al, 2008), GIS statistics, or a combination of urban scale and building scale approach with so-called macro-elements (Lagomarsino, 1998), which are repetitive elements describing the behaviour of a building during an earthquake. Such macro-elements are also a good basis to solve the digital connection of 3D CAD Modelling and GIS as aligned with the postdoc scope, being able to build a library of digital building elements. This paper is included in the final section on digital representation of hazards along with a paper presented at the NeDiMAH workshop in Bucharest with GIS employment for simulating dam breaks. This way the dimension of water related hazards is put in dialogue with the geo-hazards represented by earthquakes.

4. SOME CONCLUSIONS

The book tried to show how architecture, urban and landscape design can be seen as a branch of digital humanities and digital arts, depending on which theoretical perspective of the practical/creative process one chooses to employ. In this context, Romanian efforts were placed in the field of global ones. This way the lessons go over the timely limited efforts of the NeDiMAH network and show a way to the future, on what can be learned and what can be shared, what can lead to a spin off from universities into practical applications, from which the museum side seems the most promising at the moment, an example being given.

The book covers some of the topics of the conferences such as:

- the study of landscape over time using historical data sources, through the first section on digital landscape architecture which shows a view on space and time in landscape architecture;
- Remote Sensing and GIS for risk monitoring and the management of cultural resources in both sections of virtual recording and the one dedicated to digital representation of hazards;
- the reconstruction of historical landscapes, in the virtual reality section with the paper on pre-earthquake Lisbon and with a view in the conclusions to connected endeavours in organizing future conferences;
- finally Tools and ideas for creating a platform to share knowledge and data, since the outgoing point of the book is the NeDiMAH network, which aimed at three key outputs: 1. A map visualising the use of digital research across Europe; 2. An ontology of digital research methods; and 3. A collaborative, interactive online forum for the European community of practitioners active in this area. The book contributed to 1. and 3, to 1. through putting Romania on the map of digital research (NeDiMAH, 2015), and to 3. by contributing to organization of events during and beyond the network.

Efforts for a book launch are ongoing. Other launches will follow at the Romanian School in Rome and at Karlsruhe Institute of Technology.

5. ACKNOWLEDGEMENTS

The first author would like to acknowledge the support of Prof. Dr. Friedemann Wenzel for a renewed stay in frame of the postdoc in Karlsruhe, in frame of the postdoctoral scholarship POSDRU 133391, where this paper was prepared. The proofs of the book happened during the stay at the Romanian School in Rome, for which the Vasile Pârvan scholarship is acknowledged. The book is one of the final results of the NeDiMAH network, which also funded collaboration for some of the written papers through short visits.

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