Digital Heritage

Special Panel Session

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According to eCAADe's mission, the exchange and collaboration within the area of computer aided architectural design education and research, while respecting the pedagogical approaches in the different schools and countries, can be regarded as a core activity. The current session follows up on the first Contextualised Digital Heritage Workshop (CDHW) held on the occasion of eCAADe 2016 in Oulu (D. di Mascio et.al.) This event was thought to represent the first of a series of future contextualized digital heritage workshops and hence, the name Oulu interchangeable with the name of any other city or place. The second CDHW took place in the framework of CAADRIA 2017 in Suzhou (D. di Mascio & M.A. Schnabel) and focussed on sharing and dissemination of heritage information and personal experiences, such as narratives.The primary objective for the 2018 digital heritage session is to engage participants in an active discussion, not the longer format presentation of prepared positions. The round table itself is limited to short opening statements so as to ensure time is allowed for viewpoints to be exchanged and for the conference attendees to join in on the issues discussed. The panel will review past practices with the potential for guiding future direction.

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INTRODUCTION

This special panel session dedicated to digital heritage reflects the fact that 2018 has been designated the European Year of Cultural Heritage [1]. The slogan for the year is: *Our heritage: where the past meets the future*. It perfectly fits in what digital heritage is about and why digital preservation matters. Cultural heritage shapes our identities and everyday lives. It has a universal value for us as individuals, communities and societies. Therefore, it is important to preserve and pass it on to future generations. Cultural heritage surrounds us in the buildings of our cities, our landscapes and archaeological sites. It is preserved not only in literature, art and objects but also in craft skills, stories, food and films. Cultural heritage comes

in many shapes and forms:

- tangible - for example buildings, monuments, artefacts, clothing, artwork, books, machines, historic towns, archaeological sites;
- intangible - practices, representations, expressions, knowledge, skills - and the associated instruments, objects and cultural spaces - that people value. This includes language and oral traditions, performing arts, social practices and traditional craftsmanship;
- natural - landscapes, flora and fauna;
- digital - resources that were created in digital form (for example digital art or animation) or that have been digitalised as a way to preserve them (including text, images, video, records).

This session is focused on digital heritage in the latter meaning and discusses cases of tangible heritage, existing and non-existing, predominantly.

VIRTUAL RECONSTRUCTION: FRAMEWORK CONDITIONS

Digital heritage can be regarded as a method, which allows for an immersive presentation and exploration of spatial relationships in built structures that no longer physically exist.

The occupation with building preservation in the light of cultural heritage has a long and standing history. However, the introduction of digital media has significantly expanded the boundaries of preceding analogue representations. The erection of a detailed physical scale model is time consuming and costly. In the end the outcome can for example be recorded by way of photographs, but the model itself can only reside on one place at the same time. However, digital models can be stored at multiple places and allow for multiple usability at different locations.

Overall, the virtual reconstruction work will start with a gathering of different types of historical materials. Depending on the epoch in which the building was erected the substance of acquired information may differ significantly. Nonetheless, coping with information gaps and contradictions is an essential step in this regard.

This setup of a detailed 3D CAD-model in a structured way is of crucial importance as this model should allow it to be handled and eventually expanded in the course of time. On top of this, the creation of alternative interpretations will most likely play a role. The 3D CAD-model of a reconstruction is hardly accessible to a large number of users. In many cases, it would not even be useful or desirable to make this data source available. At this point decisions towards the dissemination have to be made. As an enhanced way of viewing a series of unconnected images/stills could be envisioned. A more comprehensive impression might be derived by way of animations and panoramic representations, if not interactive VR/AR. Whereas for the perception of images/stills no devices are required, this may cause some barriers for other ways of representation. The perspective of end-users is to explore a virtual space on their own.

In the course of time a growing number of highly detailed 3D-models has been created which need to be maintained as well. These are critical issues for research groups as software will be updated and eventually get outdated.Also remarkable is the tremendous development of modelling software in the past two decades along with a literal "explosion" of commonly available CPU-power. In other words, high-end modelling and visualisation tasks are not tied up with cost-intensive workstations and mainframes. Already on a conventional PC/laptop reconstruction work can be carried out. However, guidance regarding "intelligent" use of the tools in charge is still required.

STATEMENT 1: APPLICATIONS OF ICT IN DIGITAL HERITAGE - AN ACADEMIC UNIFICATION [MAVER]

The short history of digital heritage is interlinked to, indeed dependend upon, the emergence of what we now know as "multi-media" (MM). I was fortunate enough to visit the MIT Media Lab just at the time the Lab was developing the concept and application

of MM - the conflation, within one computer environment - of text, photos, drawings, videos, movies and sound.; a thrilling development then, that was to have a profound impact on what we now call 'digital heritage". Apple was quick to see the potential and to facilitate its uptake by bundling useful software in every sale.

Now there was a means by which the researchers of an academic community hitherto excluded from ICT, could capture, and communicate their ideas on historical, and theoretical issues previously constrained to books and journals.

For me, a technophile, it brought a new collaborative endeavour with academic colleagues from the other side of what C.P. Snow called *The Two Cultures* (Snow 1959). As with many impacts of ICT, this may in the long term, be one of the more profound.

The rapid dissemination of digital heritage has resulted in numerous international conferences devoted to the topic. Early papers, attempted to provide a classification, including Multimedia and Architectural Disciplines (Maver and Petric 1995). If one searches CumInCAD with the key words "heritage", "patrimony" no fewer than 334 hits are identified.

My current view is that within the broad term "heritage" the concerns of eCAADe and its community can be classified as:

- archaeological constructions, historical buildings, city developments, architects of note and relevant archives and museums

The research group I directed over 30 years (ABACUS) started its life in the application of ICT to the functional and measurable characteristics of future buildings. However, as we were able to embrace our colleagues in the Department of Architecture at the University of Strathclyde, we employed innovated multimedia to capture, record, story-board and disseminate works on New Lanark (a wonderful utopian World Heritage site), the City of Glasgow (with a massive document on its 2000 year development), Skara Brae (a prehistoric village, predating the pyramids - Europe's most northern and complete Neolithic habi-

tation), Edinburgh Old Town (another World Heritage site) and, more recently - and before the first and most recent disastrous fires - the Glasgow School of Art- CR Mackintosh's masterpiece.

Many of these applications deployed 3D modelling of the targeted buildings; that is a full three dimensional geometrical representation of the current or former artefact. More recent there has been a growth in scanning of sites by emerging laser technologies; this has been used to great effect by "The Scottish Ten" (a collaboration involving the Glasgow School of Art and Historic Environment Scotland), including St Kilda, Rosslyn Chapel, the Sydney Opera House and Mount Rushmore.

Whereas laser scanning provides a truly accurate visualization of what exists (ie remains) it is less suited to the attachment of meaning than is 3D geometric modelling. Taken together, these two complementary technologies are uniquely appropriate to emerging "augmented reality" a powerful way to feed the apparent growth in the public's enthusiasm for our Cultural Heritage..

The work of ABACUS and the Scottish Ten depends, I am pleased to say, on the interest and concern of our Scottish public services and their commitment to our heritage - namely SCRAN (the Scottish Cultural Resource Access Network) and Historic Environment Scotland.

STATEMENT 2: EMERGING TOOLS FOR HERITAGE PRACTICE: WHAT IS OUR RESPONSE? [NAGAKURA]

Practice of spatial representation is going through the second digital transformation. In 1990s, availability of modeling and rendering software enabled computation of geometry, materiality and light, and architects and film-makers started crafting spatial visualizations with various degrees of formal complexity and photorealism in images and animations. In architectural offices, traditional drawings, scale models, photos and videos were gradually amended or replaced despite the initial resistance by many. And we see all the amazing special effects in movie theaters

today.

Over the last decade, we are witnessing the second transformation with expanding set of tools and resources, which are attracting different kinds of players. YouTube is playing panoramic videos posted by the public. Many parts of the globe are scanned into virtual 3D cities, distributed by Google Earth and consumed. Enthusiasts are using cloud-based photogrammetric services to turn their field photos into digital architectural models and uploading onto Sketchfab. Online real estate ads come in interactive tour format produced by portable LiDAR and game engine software. Microsoft is distributing VR contents of cultural heritage locations. As part of Museum 4.0 enterprise, curators are experimenting with AR-based smartphone solutions in place of traditional audio guides.

Architecture, Hegel's first kind of art, is peculiarly complex. It is immobile and tied to context. It has exterior and interior too intricate to grasp at a glance, and instead relies on audience circulation to comprehend. Its experience is sensitive to the observation time that changes illumination, event, and other conditions. With architecture not easily replicated like paintings and sculptures, such complexity gives representation an important role to play, for conveying built projects in remote locations, describing demolished places, and conceiving design projects unbuilt. And practice of architectural representation is a struggle to find a right method to communicate spatial ideas, compositions and experience, whether it is to locate a particular section cut, to identify appropriate abstraction in a volumetric model or to invent a commanding vantage point and lighting for a perspective rendering. It is a process of selection and creative design itself.

The technology toolset of the second transformation is presenting possibilities and opportunities to add new dimensions to architectural representation, which can be frameless, immersive, interactive, and remote. Panoramic videos break the boundary of framed animations. VR with a headset brings immersive experience unlike the seeing in the previous computer graphics media. Similar to the real architectural experience, audience may be let free to move and explore the virtual space without his or her view imposed by the curated framing and trimming made by the producer of the image or animation. AR presentations can interactively layer and align a variety of digital information onto a physical drawing, model or site, instead of presenting each digital medium separately in its own space. And online distribution platforms and expanded bandwidth help audience in remote locations simultaneously share these immersive and interactive contents. Scanners and photogrammetric applications has also redirected the photorealistic representation from the Platonic idealism of computer rendition to a reality frozen with weathered, aged, live architectural surfaces. Potential impact of these new methods in the practice of architectural representation must be considerable.

Bjarke Ingels's onsite presentation of his project at West 57th street in New York was made in "VR 360 film" viewable in YouTube through Google Cardboard headset about a year after the online video platform launched the support for panoramic format in 2015. However, while we see today explosive development of such technologies and their adaptation by the mass, the reaction from mainstream architects is largely muted. In architecture schools, those tools are rarely found in studio presentations and during desk critics. Architectural history classes commonly rely on PowerPoint projections of drawings and photos, and education practice rarely embraces virtual and augmented realities as means to talk about historic designs. There is a clear discrepancy between the reaction of the public to these technologies and that of architectural community.

Is this discrepancy due to some fundamental mismatch of the technologies to architectural representation, or just a lag in adaptation? Is there still any missing link in the pipeline of new technology-bound practice or just a lack of accumulated resources to be put in use? Is there new considerations to be made on issues such as copyright and citation? We now are at the timely juncture to look at pioneering experi-

ments, critically examine them, and discuss current and future responses to these emerging technologies by the architectural community for research, education, and practice.

This panel session welcomes discussions on any important built and unbuilt architectural designs of all times as our heritage, and includes a contribution from project examples by a team at Massachusetts Institute of Technology, that investigates spatial representations of cultural heritage locations such as Palladian Villas in northern Italy, Alvar Aalto's modern buildings, and Inca remains in Machu Picchu.

STATEMENT 3: 360° NARRATIVE GRAMMAR - WHICH APPROACH TO TEACHING AND CREATING CONTENT? [LESCOP]

VR has now moved from industry to everyday application. Mainstream software and devices allow artists to create contents with a fast learning curve. Since 2014, with the launch of Google Cardboard and 360° cameras at a reasonable price, with the massive success of Unity 3D and Unreal UDK, real-time immersion is no longer controlled or guided by experts but is spreading to creative enthusiasts, which has resulted in extensive production of content. Similarly to the early age of photography and then cinema, questions about composition, narrative structure and visual grammar are slowly emerging.

Narration in VR still means telling a good story. If there is no story, it is a technical demonstration or a tutorial, as long as one considers that those too can hold a storyline. In classic narration, the story is always a line where it is possible to choose between several options. Those options are like nodes. There is a potential of infinite options for each node. Can we regard VR as an imitation of real life or is VR trying to copy the look and grammar of the visual arts? VR narrative is strongly linked to the device on which it is played. There is a general idea of progression from the flat screen to the immersive headset, with the image filling the entire field of vision and being more immersive. The history of machines of illusion shows that the way of preparing the audience, the size of the picture, the shared experience, the set where the story is played out are just as important as the content itself.

Classic narrative figures can be adapted to VR narrative, creating a specific grammar. In this grammar, time becomes space. Figures like ellipses, prolepses and analepses are modelled as spaces, especially when there is continuous narration. The grammar of films is also adapted, as it is harder to change frame values, have cuts or shot / reverse shot, or even reaction shots. Sound can direct one's attention from one point to another, or create a close-up by isolating a sound. We saw that non-figurative VR experiences are perfect platforms to test and invent this narrative grammar.

The main issue is this off-screen notion. In classic filmmaking, in theatre, the off-screen is where the audience fills what is not seen with imagination. On the operational side, it is also where the technology is. In VR, the off-screen has to be suggested by sound, opening the fields of virtual worlds even wider."

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[1] http://europa.eu/cultural-heritage/about