



## Abstracts Volume - 22<sup>nd</sup> International Conference on Cultural Heritage and New Technologies

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- City of Vienna, Department for AUTOMATED DATA PROCESSING, INFORMATION AND COMMUNICATIONS TECHNOLOGIES
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# Urban Archaeology and Integration

Combining archaeology, history, and new technologies

The aim of this conference is to enhance the collaboration between historians and archaeologists and related disciplines using new technologies and to showcase best practice applications in multidisciplinary research. The conference organizers invite sessions dealing with one of the following topics or a combination thereof:

- Application of effective 3D-methods for the reconstruction of buildings, integrating archaeological excavation data with historical sources including images, thus increasing our understanding of the past
- Additional digital methods for the combined visualisation of archaeological and historical data (e.g. monitoring changes and preservation of archaeological monuments based on historical images).
- Application of new technologies to assess the archaeological record based on historical data (maps, tax returns, inventories, ship wreck lists, etc.) and/or combining historical sources and archaeological data in a geographical information system for recording the history of urban or rural landscapes.
- Games, apps, and teaching software integrating archaeological and historical knowledge
- Historical data as a basis for checking or validating digital tools applied in archaeology and vice versa.
- Dealing with inscriptions (including cuneiform, hieroglyphs and symbols): digital methods for enhancing readability (e.g. Reflectance Transformation Imaging), pattern recognition of letters or pictograms, comparison of hand writing (same author?).
- Statistical analysis investigating the correlation between historical place names and archaeological evidence.

*Scientific Committee*

**Content:**

**Advanced Archaeological Trainings**

Training 1 – Integration of Archaeological, Historical and Surveying Data Documenting a Mining Landscape

Training 2 – Archaeological Geospatial Infrastructures - Searching, finding and using findings and their documentation with geospatial catalogues

Training 3 – Professional presentations

**Round Tables**

Round Table 1 - Interpreting Cultural Heritage during Conversion Projects

Round Table 2 – The Application of Games, Immersive Environments and Role-Playing in Cultural Heritage

Round Table 3 - Data model beyond the digital 3D model

**Sessions:**

Integrating historical maps and archaeological data using digital technologies

3D Documentation in Underwater Archaeology: Photogrammetry, Georeferencing, Monitoring, and Surveying

Cultural Heritage and Armed Conflicts

New Approaches to Medieval Structures and Space

New Realities 3: Virtual, augmented reality and ALL other techniques in Cultural and historical Heritage for the general public

Reflections and research on archaeological practices in the digital era

PhD / Master Session

3D digital reconstruction and related documentation sources

Adding life to written sources by studying the dead

The Employment of Mobile Applications for Survey, Documentation and Information

**Poster Session**

**App Session**

models of the extant structures excavated in 1962 and surveyed using photogrammetric approach. The integration of this kind of data allowed the arrangement of this city's sector to be interpreted. Basing on this, a volumetric reconstruction was performed. The reconstruction of the missing part was mostly based on comparisons with similar structure from other archaeological contexts and using data coming from existent building and archaeological studies performed on the city. The reconstructive record has been recorded and managed using the Extended Matrix. Workflow and integration procedures of different techniques will be deepened step by step in the article highlighting advantages and possible developments.

**Relevance conference:**

The contribution integrates new technologies with the aim to enhance the scientific interpretation and hypothesis making of an ancient archaeological context.

**Relevance session:**

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**Innovation:**

The innovation of the paper is in the evaluation of methods able to combine the geophysical and photogrammetric techniques into a virtual reconstruction hypothesis.

**References:**

1. Koch, J., L. Kühne, R. Linck, and J.W.E. Fassbinder (2013), 3D-reconstruction of Roman sites in Bavaria based on geophysical results, in *Virtual Archaeology*, edited by State Hermitage Museum St. Petersburg, pp. 94-102
2. Gaffney, C. (2008), Detecting trends in the prediction of the buried past: a review of geophysical techniques in archaeology. *Archaeometry* 50(2). pp: 313–336

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***Claudian Aqueduct in Rome, from the 3D survey to the virtual reconstruction according to archaeological records***

**Keywords:** Aqueduct , Rome , virtual reconstruction

**Abstract:**

This paper presents a possible way to manage a virtual reconstruction of the Roman aqueduct Aqua Claudia in Rome, in particular, the section between Tor Fiscale and Porta Furba. The aqueduct is a peculiar monument, because it spans multiple scales: it has an architectural scale, as a building, but also a landscape scale, as a part of the local geography, and also a detail scale, considering each section as a single entity, with traces and characteristics worth to be investigated.

Furthermore the modern urban illegal development and the fragmentary conservation status of the aqueduct due to a wide middle-age mining phase, resulted in the monument being split in several chunks, each one, now, an object on its own.

These considerations had a great influence on the methodology and on the data recording technique we had to choose: a classical total station survey was paired with a photogrammetric campaign, to cope with the different scales of the monument to be documented.

For the second step, that is the organization and visualization of the collected data, we chose to work with 3DHOP (3D Heritage Online Presenter), an open-source software package for the creation of interactive Web presentations of high-resolution 3D models. Using this tool, we have built a “3D hub” that, at different scales, can link together the 3D geometry, the data from the ground surveys and the classical archaeological records, providing a more immediate and structured access to the available information.

Thus, we have split the visualization into two different layers: the first one, at a landscape scale, let us to have a complete view of the section; the second layer is focused on the single chunks of the monument, especially on their structure, to better understand the ancient building techniques and its evolution in time. The surveyed data will be also enriched with a modeling of the original shape of the aqueduct, and of its modifications.

**Relevance conference / Relevance session:**

The paper is focused in integrating archeological data in the framework of the ancient and modern cityscape, integrating different media using 3D as a spatial organization substrate.

**Innovation:**

We use the 3D data to provide a more natural access to the gathered information, exploiting the geometry space to spatially organize the data, and following the multi-scale nature of the monument.

**References:**

1. Ministero per i beni culturali\Istituto Nazionale per la Grafica – I.W.S.A. – A.C.E.A., “Il trionfo dell’acqua. Immagini e forme dell’acqua nelle arti figurative”. Ernesto Paleari Editore, Roma, 1986
2. 3DHOP: 3D Heritage Online Presenter  
Marco Potenziani, , Marco Callieri, Matteo Dellepiane, Massimiliano Corsini, Federico Ponchio, Roberto Scopigno, Visual Computing Lab, ISTI CNR, Pisa, Italy

**Figure:**

