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The Cortona Heritage Project: Digital Applications in Education to Architectural and Archaeological Heritage

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Abstract. The paper presents the first results of the Cortona Heritage Project, which takes the opportunity to use the techniques of Virtual heritage to implementing concrete and innovative modes making the very rich cultural heritage of ancient Tuscan cities accessible for more people and engaging new publics by promoting its knowledge among young generations.

The project includes some digital applications aimed at valorisation conceived for the adoption of smart forms of complementary education to the architectural and archaeological heritage of Cortona, made of architecture, archaeology, art; despite Cortona is already a city characterized by a very tourism developed in quantitative terms then to improve more in terms of quality of the visit. *Cortona Heritage* is therefore set on three following axes. Enhancing the cultural heritage of the city by favouring a simultaneously deeper and smart knowledge, promoting slow mode of visit to already too much abundant streams of tourists streams, overcoming the concentration of people only in the historical centre enlarging the area of interest to the newly established archaeological park. The project was founded in 2017 in the context of the collaboration between the Department of Architecture of the University of Florence and the Municipality of Cortona (Tuscany, Italy) and foresees three years of didactics and research activities.

Keywords: Cortona · Maec · Digital survey · SFM · Virtual heritage

1 Introduction

The Cultural heritage is in principle associated with positive values of strengthening identity, social cohesion and economic development, especially for the close relationship between cultural heritage and tourism, one of the sectors that in special extent reap the benefits of cultural heritage, so that the 2018 European Year of Cultural Heritage focuses particularly on promoting the connections between tourism and cultural heritage¹.

¹ “Cultural heritage: for a more sustainable future in Europe”, Opening of the Conference, Plovdiv, 26/3/2018, (https://ec.europa.eu/commission/commissioners/2014-2019/navracsics/announcements/opening-statement-eu-presidency-conference-cultural-heritage-more-sustainable-future-europe_en).

But the relationship between Cultural heritage and tourism can take on characters of particular delicacy in contexts of ancient history and a special attention needs to be focused on the sustainability of tourism, in order not to take risk due to material or immaterial damages to the places which attract so many people and promoting any development taking into account the needs of the inhabitants.

One of the approaches that can help mitigate the problem of mass tourism is the use of ICT technologies.

“Cultural heritage breathes a new life with digital technologies and the internet. The citizens have now unprecedented opportunities to access cultural material, while the institutions can reach out to broader audiences, engage new users and develop creative and accessible content for leisure and education. New technologies bring cultural heritage sites back to life”²: in this expression, although in a general tone, the virtuous link that can be established between the cultural heritage and the use of technologies or internet is recognized on the level of the European Commission (Directorate General for Communications Networks, Content & Technology).

The current potential of ICT systems for Virtual Heritage, in particular, whether is declined as tools for the production of contents elaborated through methodologies of significant and highly digitized representation or as tools of immersive exploration of the contexts, they are in fact a field of research and technological transfer, in particular in the discipline of Drawing, today in fast transformation: for the development which is taking among the specialists, for the rapid expansion of its use by people that frequents more and more museums, exhibitions, sites and archaeological areas, for the growing interest and expectations of museum administrators and curators (Brusaporci 2015; Pescarin 2016).

The scientific research in the field of surveying and digital representation has well established methodologies that have seen an ever-increasing hybridization with new languages: a more advanced use of 3D visualizations to describe the environment has forced us to look more closely at those experiences of digital visual storytelling and multimedia languages, e.g. movies and videogames.

At the same time, the massive diffusion of mobile devices as well as their technological development, gave us the opportunity of reaching an increasing number of users who approach the newest ICT technologies.

Therefore, the virtual reconstructions based on the data collected during the surveying campaigns offers the possibility to make interactive simulations and interpretations of a context and to display complex information in visual way using a communication tuned on a wide and diversified audience of users (Forum Internacional de Arqueologia virtual 2011).

Finally, this kind of promotion of CH in all categories of citizens, together with the renewal of approaches and languages, is the crucial key to attaining cognitive and emotional knowledge through active educational activities.

Basing on these critical premises in 2016 the project Cortona Heritage has been established, held by the University of Florence-Department of Architecture and which takes place in the framework of the collaboration with the Municipality of Cortona.

² <https://ec.europa.eu/digital-single-market/en/digital-cultural-heritage>.

2 Goals of the Research

Cortona Heritage was conceived with the general aim of strengthening the unitary perception of the various material expressions that make Cortona a very popular and turistically appreciated city, but also characterized by a considerable imbalance in the flows of visit between the historical centre, the renewed “Museum of the Etruscan Academy and the city of Cortona-MAEC” and the recently opened archaeological Park of Cortona; Cortona Heritage was therefore in wider terms conceived to simulate a digital information environment of education to the whole Cortona cultural heritage - and not only aiming to the tourist promotion, indeed already present with high intensity flows- with technologically advanced spreading modalities.

The project is based on a few and clear strategic axes centered on multidimensional objectives: the general one, wide-spectrum dissemination of the city’s cultural heritage (in its meanings of urban environment, architecture, archaeological and artistic heritage), and a specific topic related to the promotion and the support through smart fruition to the visit of the new Archaeological Park of Cortona (Bertocci and Arrighetti 2015) (Fig. 1).

3 Innovative Patterns

According to the definition already present since 2004 in the Italian “Code of Cultural heritage and landscape”, the cultural heritage includes cultural and landscape heritage to be protected and exploited to preserve the memory of the community and the territory and to promote its development: besides the many other general and constitutive presumptions, the cultural legacy is therefore defined also by the characteristic of being constantly changing, following the transformations of the social environment of which it is simultaneously memory and development trigger; in this key is to be read the effort of the most recent lines of cultural policy that explicitly challenge the engagement of new publics as one of the most important fields of action of the actual museography (Luigini and Panciroli 2018).

Cortona Heritage works on this track following the guidelines already developed in the program Digitch (Puma 2018), implementing it in spite of previous experiences through the experimentation of context responsive thematic applications, which are conceived by a same linguistic and technical functionality but they change following the present context (city, museum, archaeological area) automatically adapting itself to the visited place. *Cortona Heritage* is designed to implement instruments that promote as much as possible a personal, autonomous and constantly updated interpretation of the Cortona material traces, both by its inhabitants and tourists visiting the city.

By assisting the visitor in a deep knowledge of the environment -supporting him in reading the physical structure and its history, and above all making visible the evolution of time (The Charter for interpretation 2008)- is possible to achieve a form of “Significant learning” and discourage consumerist approaches to “selfie tourism” (D’Eramo 2017).

This concept of valorisation is based on these principle which involves two spaces of action for dissemination and education.

Cortona Heritage/project chart



Fig. 1. The strategy of Cortona Heritage

The first one acts with interventions towards both to public in presence and on-line, in order to foster a conscious and mature general attractiveness of the territory.

The second axis acts only in the material dimension and targets mainly to enlarge the range of visit outside the old city-center, “doubling” it with a second center of interest centered on the archaeological park.

4 The Context of the Case Study

Cortona is an ancient Tuscan town located on a hill and placed in a dominant position towards the west and south on the Valdichiana valley and protected to the north and east by the mountains that overlook the Fortress of Girifalco (Fig. 2).

The city assumed significant importance in Etruscan age, becoming important lucumonia and establishing in this period the next predominance on the wide valley of the Chiana, to become a border town subdued by Florence at the end of the period of passage from “Free Commune” to the lordship of the Casali family.

Between the XV and the XIX century Cortona was interested only in successive events that overrun the local history. The power of Cortona in the Etruscan period is testified by the wide city walls whose whole perimeter is about 3 km, by other buildings preserved in the city and especially by the important necropolis of Sodo, located in the countryside below.

Here, a few meters from the great Tumulus II, between 2005 and 2012 have been found two groups of burials delimited by circle, now covered again, dating between the second half of the VII and the beginning of the sixth century. BC and probably referable to the same family group that already had built the Sodo’s monumental burial starting from the end of the century VII until IV-III B. C. (Bruschetti et al. 2014; Fortunelli 2005).

Come from here rich and abundant furnishings preserved in the MAEC museum: large ollas in impasto ware, vases with lids containing ashes of the deceased and

Cortona Heritage/the context



Fig. 2. Geographic framework and two study cases

objects of personal ornaments. From urban context has been extrapolated the first case study of Cortona Heritage related to the architectural topic and concerning the documentation of the part of city walls between the Porta S. Agostino and the Porta Bifora.

The second case study has been chosen from the Sodo archaeological area and is focusing on the documentation of grave goods to be linked in Cortona Heritage in a unified storytelling exhibition that highlights the common nature of the historical and cultural context of the two studies.

Cortona Heritage/project output

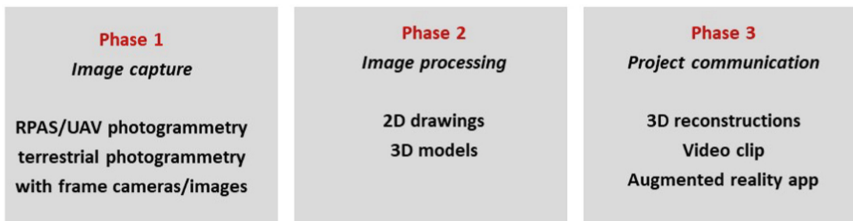


Fig. 3. Chart of the project output

Cortona Heritage/project results



Fig. 4. Some results concerning “Cortona city walls in 3D” and “MAEC in 3D”

Cortona Heritage/project results

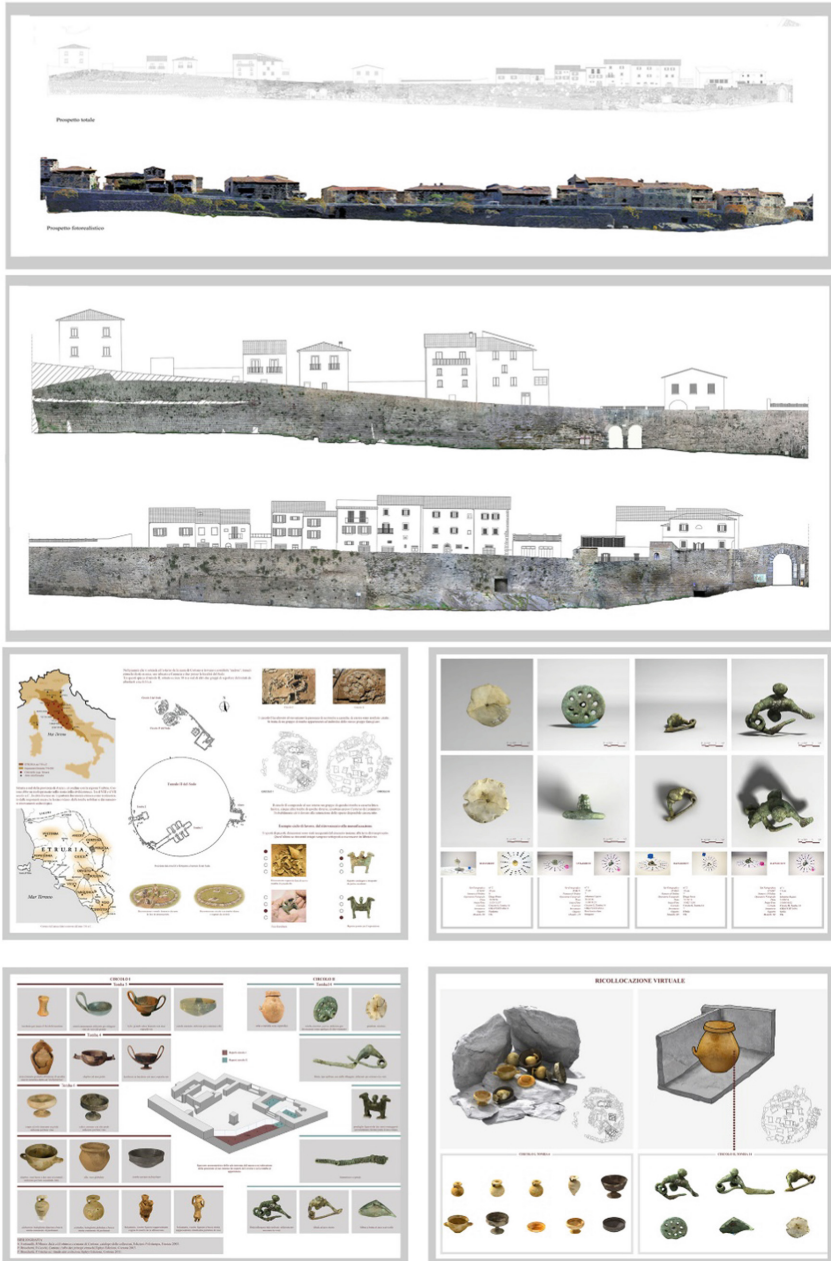


Fig. 5. Some results concerning “Cortona city walls in 3D” and “MAEC in 3D”

5 Methodology and Some Results of the Project

The disciplinary domain of main work governing the workflow is represented by the architectural and archaeological Survey and by the Drawing discipline.

Architectural and archaeological Survey makes possible the documentation of the investigated artifacts and the data processing in metadata congruent with the purposes of the project; Drawing realizes the themes communication suitable for an immersive fruition of the slow approach, in line with the type of tourism that interests the city of Cortona.

The workflow of the project (Fig. 3) is articulated in three phases:

- Image capture: realized by RPAS/UAV photogrammetry and by terrestrial photogrammetry with frame cameras/images;
- Image processing by 2D drawings and 3D models;
- Project communication: realized by 3D reconstructions, video clip, Augmented Reality app.

Cortona Heritage is a three-year work program and is now in its central phase of implementation.

The results we present here are therefore related to the first initial outputs deriving from the documentation and surveys of both sample cases (Figs. 4 and 5).

The spectrum of actions includes many flexible kinds that can be differentiated time by time according to the cultural strategies as well as the general and logistical variables.

The timing of the program is therefore defined in a scalar way over 3 years and articulates the immaterial enhancement in actions to increasing complexity from the virtual tour to the handheld hologram, to the interactive environment and to the virtual scene (Remondino and Campana 2014; Ioannides et al. 2018).

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References

- Bertocci S, Arrighetti A (2015) Survey and documentation for archaeology. A special issue of *Sires-it*, vol 5(2)
- Brusaporci S (2015) Handbook of research on emerging digital tools for architectural surveying, modeling, and representation. IGI Global, Hershey
- Bruschetti P, Cecchi F, Giulierini P, Pallecchi P (2014) Cortona, l'alba dei principi etruschi. Thiphys
- D'eraimo M (2017) *Il selfie del mondo*. Feltrinelli, Milano

- Ioannides M, Fink E, Brumana R, Patias P, Doulamis A, Martins J, Wallace M (eds) (2018) Digital heritage progress in cultural heritage: documentation, preservation, and protection, proceedings, Part I & II of 7th international conference, EuroMed 2018, Nicosia, Cyprus. Springer International Publishing, Heidelberg
- Fortunelli S (2005) Il Museo della città etrusca e romana di Cortona: catalogo delle collezioni. Polistampa
- Forum Internacional de Arqueología Virtual/International Forum of Virtual Archaeology (2011) Principles of Seville, International principle of Virtual Archaeology
- Luigini A, Panciroli C (eds) (2018) Ambienti digitali per l'educazione all'arte e al patrimonio. FrancoAngeli, Milano
- Pescarin S (2016) Digital Heritage into Practice. *Scires-it* 6(1), 1–4
- Puma P (2018) Sperimentazioni di didattica museale per l'attivazione di processi educativi evoluti nel programma Digital Cultural Heritage- DigitCH. In: Luigini A, Panciroli C (eds) Ambienti digitali per l'educazione all'arte e al patrimonio. FrancoAngeli, Milano
- Remondino F, Campana S (2014) 3D Recording and Modeling in Archaeology and Cultural Heritage. Theory and best practices, BAR International Series 2598. Archaeopress, Oxford
- The charter for the interpretation and presentation of cultural heritage sites (2008) 16th ICOMOS General Assembly

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