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DIGITAL CURATION FOR ARCHAEOLOGICAL HERITAGE: THE CASE STUDY OF MUSEO DIFFUSO CASTELLO D'ALCESTE IN SAN VITO DEI NORMANNI

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Abstract

Information and communication technologies (ICT) can provide effective solutions for the enhancement of cultural heritage (CH) when they answer to narrative needs, which often evolve and change, because of the amount of dynamic information that comes from scientific research. The following paper aims to provide a methodological approach for CH time-varying representations. The goal is to design and develop a "diachronic" application that can represent the multi-layer chronology of an archaeological site, in line with the progressive archaeological discoveries. This investigation focuses on some important issues about digital curation practices, specifically related with Augmented Reality (AR) technology for Cultural Heritage. This article aims to analyse these issues and to propose solutions by starting from a practical casestudy, regarding an AR mobile application for the enhancement of the archaeological site *Museo Diffuso Castello d'Alceste*, in San Vito dei Normanni (BR).

Keywords

Digital Curation; Augmented Reality; 3D modeling; Digital Cultural Heritage; Archaeological Heritage

1. *Introduction*

Within an archaeological context, the "absent" is often what needs to be told to a wide and heterogenous public: most of the time the promotion of an archaeological site passes through the interpretation of small amounts of almost invisible information available. Archaeologists can make some reconstruction hypotheses based on some trails and comparisons, but often, the issue for the public remains the lack of tangible elements. The need is to "augment" the reality for providing visual information in a smart way, taking care of accessibility of contents.

Nowadays, different approaches and technologies are dealing with cultural heritage (CH), to provide visual form of representation and communication, such as digitalization and virtual restoration (Pietroni et al., 2021).

Information and Communication Technologies (ICT) have revolutionized the way cultural heritage (CH) is represented and interpreted. Augmented Reality (AR) and 3D modeling offer promising solutions for enhancing the user experience and understanding of archaeological sites. However, effectively integrating these technologies to address the dynamic and multi-layered nature of archaeological heritage remains a challenge. This paper aims to address the following research questions:

- How can Augmented Reality (AR) technology be effectively utilized to enhance the representation and interpretation of archaeological open-air heritage?
- What are the challenges and the solutions in developing a diachronic application that represents the multi-layer chronology of an archaeological site?
- How can digital curation practices be adapted to accommodate the evolving narrative needs of cultural heritage representations?

To discuss these open research questions, this study deals with the case study of "Castello d'Alceste" in San Vito dei Normanni (Br), in Apulia region (Italy).

Focusing on this geographical area, it is possible to find some examples of archeological sites or artistic contexts that use digital tools for communication purpose. An example of an AR application for CH enhancement is the mobile app for the Church of St. Catherine of Alexandria in Galatina (Italy). It exploits AR technology to provide the user with an immersive and

educational tool for autonomously investigating the medieval pictorial cycle lining the walls of the church's nave (Cisternino et al., 2021).

Some experiences explore the potential of gamebased application (Checa et al., 2020), some others act on accessibility: *Agnano RiVive* is an Immersive Virtual Reality application developed for the Museum of Preclassic Civilizations of the Southern Murgia in Ostuni, where the archaeological finds of the Archaeological and Naturalistic Park of Santa Maria di Agnano are preserved. The application gives the user the opportunity to explore the Upper Paleolithic settlement, located within the park, and interact with ancient tools (De Paolis et al. 2022a). An immersive Virtual Reality application is the one developed for the Castle of Corsano, a monumental ancient building, located in a small town on the Salento Adriatic coast, currently in a state of abandonment and inaccessible for over thirty years (De Paolis et al., 2022b).

In the frame of this regional context, the project that we present here started as a master's degree thesis, and it has been designed with the aim of enhancing the fruition of Castello d'Alceste archeological site, in San Vito dei Normanni (Br).

This archeological site is also a *Museo Diffuso*, an open-air museum: the idea stems from research and experimentation in the field of open-air musealisation, conducted by the University of Salento. A *Museo Diffuso* is a museum of the landscape, in which all the aspects that make up its characteristics are preserved, not only archaeology but also flora and rural culture (Baratti, 2013).

The *Museo Diffuso Castello d'Alceste* project started from the archaeological research experiences conducted on the hill since 1995, in a framework of collaboration between the Municipality of San Vito dei Normanni, the University of Salento and the Apulia Archaeological Superintendency (Semeraro & Monastero, 2011). In 2006, the museum project was financed by "Sviluppo per il Sud" ACRI program, and Cariplo foundation (Semeraro, 2011). In 2007, the setting up began, with three main actions: the protection and enhancement of the settlement on the hill, interventions aimed at the recovery of the rural and natural landscape, and educational activities through experimental archaeology. For example, a 1:1 scale hut was created that exactly reproduces the building systems of Iron Age settlements (Fig. 1).

Fig. 1: Replica of an Iron Age hut in Castello d'Alceste (photo by Semeraro and Monastero)

2. *Augmented Reality for Archeological site fruition: a brief state of the art*

Digitization plays a pivotal role in disseminating knowledge, while the incorporation of immersive reality technologies presents an exciting opportunity to enhance accessibility to cultural heritage (Bekele et al., 2018).

Augmented Reality (AR) has become increasingly important for enhancing archaeological site experiences. Thanks to the fast evolution of AR technology, significant advancements have expanded its application, making visitor experiences more interactive and immersive (Mediati et al., 2024).

Recent developments include the creation of real-scale AR, which allows for life-sized 3D reconstructions of archaeological sites and artifacts (Condorelli et al., 2024). This method enhances the tangibility and realism of the experience, enabling visitors to visualize ancient structures and environments as they would have appeared historically (Clini et al., 2017). Outdoor multisensory AR systems represent another innovative application, integrating visual, auditory, and tactile elements to provide a holistic understanding of cultural heritage sites. This multisensory approach has proven effective in engaging visitors and deepening their educational experience (Marto et al., 2021). In educational contexts, AR has been utilized through gamification, making the learning process about archaeological sites more engaging. Interactive educational systems using AR often include game-like elements that encourage exploration and learning in a dynamic manner (Masneri et al., 2020).

Mixed reality, combining virtual and augmented reality, offers a seamless experience of past and present. By overlaying historical reconstructions over the current state of ruins, this approach enriches the narrative and educational value of site visits. Despite the advancements, challenges such as the accurate registration and alignment of digital information with the real-world environment persist. However, improvements in marker-less AR and spatial recognition algorithms have enhanced the stability and reliability of AR experiences (Rodríguez-Gonzálvez et al., 2017).

The integration of AR in archaeological sites has significantly improved visitor experiences, increasing accessibility and engagement. Virtual reconstructions allow remote visits, and multilingual support broadens accessibility to a global audience (López-Menchero & Grande, 2020). The combination of AR with AI and machine learning promises to personalize visitor experiences further by tailoring content to individual interests and learning styles. AR technology can rapresent an effective tool for the interaction with and understanding of archaeological sites, making cultural heritage more accessible and engaging. As technology evolves, the potential for AR in this field appears boundless, offering innovative ways to preserve and appreciate our past.

3. *Aim and methodology*

This project started as a master thesis research, thanks to the multidisciplinary collaboration between two Department of the University of Salento, Dept of Engeneering for Innovation and Dept. of Cultural Heritage. (Cisternino *et al.,* 2018). The requirement was to create a "diachronic" application, able to show and to tell the chronology of the site, in line with subsequent archaeological discoveries. Introducing the fourth dimension of time into three-dimensional geometric modelling of real data allows for the creation of a multi-temporal representation of a site, but at the same time this raises two important methodological issues: we discuss the priority of a narrative coherence within the application itself and the need to update the content (such as the 3D models), in accordance with the most recent archaeological discoveries, in an effective and optimised way.

Specifically, those topics of discussion are of fundamental importance if we consider an archaeological site as a dynamic system, where the excavation campaign continues to be carried out and the research can bring to light new discoveries. In this context, the application can represent a useful means for summarising research results, for a non-specialistic public, in an appealing way. These are the main topics of the following analysis, that gives shape to the methodological base for the design and development of the app.

4. *The Archaeological site of San Vito dei Normanni (BR)*

The archaeological site we are focusing on is in the area called "Castello di Alceste", in the municipality of San Vito dei Normanni (BR). The area is located a few hundred meters south of the modern town, on a slight hill (108m above sea level), from the top of which one can identify other ancient settlements, such as Mesagne, Oria, Ostuni, Ceglie Messapica and other villages that represented key points in ancient history (Cocchiaro, 1998).

The data acquired so far unearthed the existence of two phases in the settlement: the first one dated back to the Iron Age (VIII century B.C.) and inhabited by the Iapygian population, the second one from the Archaic period (VI-V century B.C.) and inhabited by the Messapian population (Semeraro, 2017). The site provides the precious opportunity to analyse the process of transformation that the Iapygian population underwent between the 8th and 6th centuries B.C. (Semeraro, 2012). Regarding the oldest phase, from the excavations it can be deduced that the Iron Age village consisted of oval-shaped huts of variable width but not exceeding 15m, with a beaten ground (Semeraro, 2015).

The evidence of habitation of the area is also confirmed by the findings of pottery, made in reddish-brown mixture, painted with geometric motifs. The inhabited area had to be protected by a wall, as was evident from the traces visible on the aerial photos and confirmed by excavation data. A progressive reorganisation starts in the 6th century B.C. The hill of Castello di Alceste sees the birth of a new housing settlement, which occupies the area above the inhabited area of the Iron Age, and extends even further, to occupy about 23 hectares.

This is therefore a Messapic settlement which overlaps the older one and which continues to be frequented until the early 5th century B.C., a period in which it is then abandoned and never again inhabited (Semeraro, 1998).

The archaeological data shows the presence of a growing clomplexity system (Semeraro, 2018). It must be remembered that the process of transformation between the 8th and 6th centuries B.C. in the indigenous world of Salento coincides with a flourishing period of remarkable development of the Messapian settlements. The distinctive features of the Messapian culture become clearer and there are further transformations regarding social organisation, material culture and rituals. From a structural point of view, more details about the ancient structures of the two periods will be provided in the paragraph number 5.2, where the design of the 3D models is put in relation to traces and archaeological data.

5. *The Augmented Reality application for San Vito dei Normanni*

The mobile application developed for this research is a tool for exploring the archeological site, by means of Augmented Reality. By focusing with a mobile device on the ortophoto of the archaeological area, and by selecting the age and the items that the user is interested about, some 3D models are superimposed on it, and combined with other kinds of content, like text, images, video and audio, to allow the visitors to fully understand history and features of the ancient site.

We decided to develop a tool capable of dynamic interaction: when a user detects a point of interest (POI) over the 3D model, he\she can get information about that point by going closer to it with the camera of the smartphone; in this way the app responds automatically by providing some information about that object on the screen in a intuitive way and without any tap on the screen. This is one of the innovative features of this app, expecially from an implementation and interaction point of view.

Thanks to AR technology, the user can visualise the 3D model superimposed above the orthophoto for each archaeological phase, interact with the virtual objects and read detail sheets about stuctures, pottery and life. The application has been developed by one Master thesis candidate, with the help of the engineers of the Augmented and Virtual Reality Laboratory AVR Lab) of the University of Salento, in the time of six months, that is the duration of the thesis research work.

The application exploits Vuforia, as augmented reality SDK. It can recognise 2D target (Image Target) in a markerless system, but also 3D objects (Object Target) and Multi-Target. The application has been developed in Unity, a cross-platform game engine aimed at developing video games and virtual and augmented applications for PC, consoles and mobile devices. The 3D models have been created on Blenden and Cinema 4D. By integrating Vuforia with Unity, the applications have been developed for mobile device, in particular Android and iOS systems. The image target for the AR consists in an orthophoto of the archeological site (Fig. 2).

Fig. 2: Ortophoto of the settlement

The equipment for the aereal photo shooting, consisted of a DJI Phantom 4 PRO drone and a Samsung Galaxy Grand Prime smartphone (Android version 5.0.2). The design and development of the app is in accordance with the so-called "London Charter[1]". Since 2006 this defines the principles for the use of computer-based visualisation methods in relation to intellectual integrity, reliability, documentation, sustainability and access. Indeed, these principles ensure the transparent use of digital technologies in cultural heritage projects, where the app clearly states its objectives, methods, and results, allowing users to assess its accuracy and validity.

[1] The London Charter for the Computer-based Visualisation of Cultural Heritage was conceived, in 2006, as a means of ensuring the methodological rigour of computer-based visualization as a means of researching and communicating cultural heritage. Also sought was a means of achieving widespread recognition for this method.

It maintains detailed documentation of all processes to ensure the reproducibility and verification of results. The app is designed for sustainability, ensuring its long-term preservation and accessibility. It prioritizes accessibility and usability for a broad audience, including academics, students, and the generic public. Additionally, the app ensures interoperability, enabling seamless integration with other digital data and systems. Finally, it promotes collaboration across various disciplines and institutions to enhance the quality and utility of its digital representations.

After this prototyping phase, the application can be made available on both iOS and Android platforms to ensure broad accessibility. Users will be able to download the app from the respective app stores, and the manager of the archaeological site is considering partnerships with local museums and cultural institutions to provide QR codes at physical locations, facilitating easy access to the application.

The idea is to establish a dedicated technical team responsible for ongoing content updates, working closely with archaeologists and researchers to ensure that new discoveries and information are promptly integrated into the application. Regular updates will be scheduled to maintain the accuracy and relevance of the content. Once the app is published, a feedback system can be integrated to gather user input and continuously improve the user experience.

5.1 User experience design

The application has been designed to be used as a lens over the ortophoto of the site: by focusing with a mobile device on the planimetric map of the archaeological area, some 3D models are superimposed on it, and combined with other kinds of content, like text, images, video and audio, to allow the visitors to fully understand history and features of the ancient site (Fig. 3).

The use of the mobile app is based on the availability of the orthophoto of the site, so it's possible to provide two different usability cases:

- within the archaeological site thanks to a printed map, visitors can walk along the route and focus their mobile device above the map to get 3D information.
- within the museum visitors can focus their mobile device on a printed orthophoto installed on a panel or on a table in a dedicated hall.

In addition, during the design phase, the need emerged to ensure "active" user interaction with the 3D model that is being reconstructed, while respecting the usability and effectiveness parameters. Also, in this case, it should be remembered that an excessively dynamic interaction cannot be carried out in an outdoor context, since the visit to the context already involves a walk in an outdoor place.

Fig. 3: Use case hypothesis: a mobile phone focusing on the orthophoto of the site and visualisation of the model.

The usability of new solutions is a central topic for modern museology: the need is to test digital tools, to compare the results and to learn more about the changes that are happening in human perception and learning.

Moreover, by means of an AR app like this it is possible to promote a connection between the site and the museum that preserves the collection of that site, in a cycle of interconnections and narrative relationship.

The methodology that we adopt for this project can be summarised in the expression "diachronic visualisation": according to the studies in literature (Rodríguez-Gonzálvez et al., 2017) we refer to "diachronic visualisation" in cultural heritage when we introduce the fourth dimension of time into three-dimensional geometric modelling of real data. This allows the creation of a multi-temporal representation of a site.

The capacity to "see" the dynamic evolution of CH assets across different spatial scales (e.g. buildings, sites, cities or territories) compressed in a diachronic model, provides a better understanding of the present condition of the environment in relation to its history.

Regarding the Castello di Alceste site, the diachronic visualisation represents the answer to a specific need: we want to provide the user with a tool for "scanning" the real stratification of the archaeological site by focusing on an aerial photo of the site, and without a tap on the screen.

In particular, the application has three different sections (Fig. 4): "site today", with general information regarding the Museum, historical and archaeological information as well as practical information; and the two augmented reality sections called "Archaic Settlement" and "Iron Age Settlement".

Fig. 4: Three sections of the application

In the diachronic narration we want to provide the idea of the passage of time as a process of social, economic and technological changes. So, in addition to the differentiation of the main structures across time, we also consider all that amount of information which comes from the excavations, concerning for example pottery, both for ritual and food conservation, as well as faunistic and botanical remains (De Grossi et al., 2015). It is important to consider these objects as direct links with the territory: some of those artefacts are preserved in different museums that can be interconnected in a digital network via our application.

5.2 The augmented visualization: 3D Models and AR interaction

The focus of our AR application is the experience that the user has while interacting with the 3D reconstructions of buildings or artefacts. Each piece of multimedia data provided, such as the 3D models, must therefore comply with the data coming from the archaeological excavations and studies carried out on this data.

To develop the first prototype of this AR application, a 3D representation of an archaic-age building was provided to the developing team (Fig. 5): the so-called Building A (or "Grande Edificio").

Fig. 5: Virtual reconstruction of the arcaic building (concept by Grazia Semeraro, modelling by Massimo Limoncelli).

After taking aerial photos of the archaeological site, the first step was to test the photographed area to identify the target for the augmented reality application. It must be noted that to have a suitable target, the algorithm needs to recognise a consistent number of features on it. The next step was to evaluate how the virtual models would overlap the "real-life" target. We started from the heaviest 3d reconstruction, to be sure that the app could work well also for the lightest models. Therefore, Building A is a big structure (more than 16m long), located on one of the sides of the "square", and in a central position compared to the development of the rest of the urban system (Semeraro, 2012).

This building can be related to public functions, such as ceremonies and rituals that can also be assumed thanks to the traces of different kinds of pottery, both produced on site and imported from Greece (Semeraro 2012).

The desire to extend the project on a diachronic scale brings with it some critical issues that must be addressed.

As already said, the archaeological site of San Vito has revealed widespread traces of an Iron Age settlement, often covered by archaic structures. We then moved to working on the other section of the app, the part dedicated to the village of Iron Age huts, located on the top of the hill, in an area of about 10 hectares. The huts were modelled according to the construction features which emerged from the excavation data and superimposed to the aerial photo.

Although the presence of the next inhabited area makes exploration difficult, since some huts lie below archaic age levels, it was possible to identify some housing units. The largest (Capanna 1) was identified thanks to the trace of the perimeter wall.

Fig. 6: Virtual reconstruction of Capanna 1

The walls of the huts were made of stones mixed with clay, and with wooden poles that supported the roof. The thickness of the walls was about 1 meter (Semeraro, 2015). It is possible to estimate a length of 13 m and a width of 6.4 m.

Made of vegetable materials, the roof was pitched, so allowing the outflow of water (Fig. 6).

Inside the hut there was generally a hearth, which was used both to heat the environment and to cook food, in addition to the vases in which cereals and other foodstuffs were kept. A smaller structure was found next to the first one (Capanna 2): its dimensions can be calculated as 8.40 m x 6 m. A third unit, investigated between 2007 and 2008, provided more exhaustive data (Capanna 3). The floor plan (8.30 m x 5.80 m) was recognised entirety, thanks to the perimeter wall of small stones, 0.90 m wide, which rests in some points on the base rock.

This hut is located adjacent to a fence wall, made of small stones and about 3 metres wide. (Fig. 7).

More than three meters wide, the wall consists of a double face of large stones, with a filling of smaller stones.

Although several stratigraphic data on the phases are currently lacking, it is very likely that this structure dates back at the 8th century B.C.: one of the most significant clues is the spatial relationship between the hut structures and this wall (Semeraro & Monastero, 2011). The application should be able to show the relation between structures of the same period and to give the idea of continuity from one settlement to another.

Fig. 7: Virtual reconstruction of the Iron age settlement

To achieve this goal, the app allows the user to choose the category of 3D objects to be displayed. Once selected, these are placed in space according to their function, which is then explained by specific textual or audio insights.

For instance, about the Great Building of the archaic age, once the entire perimeter of the foundations was brought to light, the subdivision of the building's rooms was hypothesised with some accuracy and, based on the type of ceramic artefacts found inside each compartment, it was possible study the intended use that they had. The 3D modeling therefore involved, in addition to the building, the two identified macro ceramic typologies: those for daily use, for the preservation of food and for cooking, and those for ritual and cultual use.

Also, the object within the courtyard of this building deserves a special mention: It is conceivable that the presence of a large ablution vessel and mound of stones probably served as a sacrificial altar, used in the rites. The interactions with the 3D models aim to provide an idea of those connections.

An important topic during the AR application's integration of the 3D models was the design of the user experience, to provide the user with a dynamic and engaging system of interaction. (Cisternino et al., 2018)

We decided to develop a tool capable of dynamic interaction: when a user detects a point of interest (POI) over the 3D model, he\she can get information about that point by going closer to it with the camera of the smartphone; in this way the app responds automatically by providing some information about that object on the screen in a intuitive way and without any tap on the screen (Fig.8). This is one of the innovative features of this app, expecially from an implementation and interaction point of view.

Fig. 8: Interaction of the AR camera with the virtual POI and restitution of the related information sheet

5.3 Storytelling and Narrative Coherence

Analysis of the context provides the opportunity to identify those keystones around which it is possible to build coherent storytelling. The evaluation of the most suitable technology for achieving specific narration goals is, in fact, a digital curation operation.

Every type of media, digital or not, has its own features and can be placed in relation to the space and the public, creating with them a sort of "cognitive triangle". If we assume that the application is used outdoors, it can only partly be considered as an evolution of the traditional paper brochure or an infographic on the panels found in an archaeological park, since the method of promoting the cultural heritage changes completely, from a passive to a more active kind

If we assume that the application is used indoors, i.e. within a museum, it can be seen as a "scanner", a tool in the visitor's hand that can give virtual information in a dynamic and active process, in which the research of signifiers and significances is visitor driven. Therefore, what remains unchanged is the need for consistency in the story, between the archaeological evidence, the research, and the storytelling, that can reache both the common and personal public domain.

Precisely based on these reflections, we emphasised the theme of "visibility". Starting from the case studies illustrated above, it is possible to highlight some aspects that seem to characterise more generally the chronological transformations in Salento. The theme that seems to summarise the main changes is that of the "visibility" (Semeraro, 2011) of the settlements, of which there are three different meanings. First, there is an archaeological visibility that comes from the documentation. Then there is a visibility linked to the topographical position of the settlements, and to the possibility of exercising visual control over the surrounding area.

Finally, there is an intrinsic visibility: how the site appeares today. We can go now more specifically inside these meanings, trying to extract those features that can characterise the narration. Regarding the first meaning of the word "visibility", the absence of archaeological evidence is a phenomenon that afflicts a long period, from the Final Bronze Age, First Iron until at least the middle of the eighth century B.C., for this reason the walls represent a rare type of monument in the Iron Age framework. Regarding the second, Castello di Alceste is in a visible position and from which one can enjoy good visibility of the surrounding area. These are modest reliefs, as is typical of the Salento territories, even in the hilly area of the Murgian plateau. The presence of the walls enhances the characteristics of the place chosen for the settlement, also significantly extending the field of visibility accessible from the top of the hill.

As far as the third meaning of "visibility" is concerned, as we said, it corresponds to what is visible if we take a real photo of the settlement. This step was fundamental since we conducted firstly an aerial photo campaign of the area, by means of a drone[2]. Then those photos were processed to obtain the target for the AR app. According to these due considerations, the project found its narrative coherence in the visibility process: in this sense the AR technology can be seen as a means for the visitor to scan the different "layers" that corresponds to different settlements, or to different levels of observation of the same settlement.

6. Discussuion and conclusion

In the last part of the research vork, a beta test was conducted on the prototype the application presented. First, a select group of users, a mix of professors, researcher and students, with different technical expertise, was chosen to participate. The prototype was then distributed to these users with clear instructions on how to install and use the app. Testers were asked to use the app in real-world conditions, thoroughly exploring its features and functionality. During this period, they document any issues, bugs, or usability problems they encounter. They also provide feedback on the

[2] DJI Phantom 4 Pro drone.

overall user experience, including the app's interface, performance, and the accuracy of the 3D models. This feedback was gathered through interviews and direct observation. The data collected were then analyzed to identify common issues and areas for improvement. Based on this analysis, the app was improved with the necessary adjustments and refinements, expecially in terms of small bugs related to the AR SDK. The data collected showed that users like to use AR app as a "magnifier", interacting with the virtual object to get information, without clicking on the screen. The goal of the beta test was to ensure the app is robust, user-friendly, and ready for a wider release. Users highly appreciated the simplicity of the interaction and the realism of the historical reconstructions. AR technology integrated into a simple mobile app is a very effective and immediate tool for visitors for a diachronic journey and interpretation of the archaeological site, especially since real aerial photographs of the archaeological site, that also preserve visible trace evidence, were chosen as the AR targets. this was indicated by users as something innovative and something they were experiencing for the first time.

Additionally, a System Usability Scale (SUS) test will be conducted afterward to further evaluate the user experience and the learnability (Brooke 1996).

In conclusion, this prototype app based on AR technology provides visitors of the archaeological site with a tool able to "scan" the real stratification of the archaeological site by focusing on an aerial photo. What the archaeologist does in an excavation is to go from the top to the bottom, and to explore the surrounding area every time a settlement is found. In the same way the app, thanks to AR technology can show to the visitor different "layers" that correspond to different settlements. It also displays 3D models of those objects that are related to this layer. In this way, every time we have new upgrades in terms of studies and research, the multimedia tool can be updated with new layers, new models and new information. This is extremelly important because it maintains a coherence between scientific research and how the generic. The distribution of the app, through museums or sites, can be simultaneously refreshed, ensuring the same level of information distribution, homogeneously, wherever the app is in use. Technology can be a tool for engaging community in compliance with this Faro Convention adopted by the Committee of Ministers of the Council of Europe on October 13, 2005, ratified in Italy only in 2020. In the heart of Europe, the mobile augmented reality (AR) showed the potential for revitalizes archaeological sites like Italy's Pompeii and Greece's Acropolis. In this scenario, also smaller archaeological site, like the one of San Vito dei Normanni, can adopt smart solutions to provide immersive experiences.

This project has been carried out according to the European strategic axes about CH digitization, that include tangible and intangible heritage (Boboc et al. 2022). This is important not only to enhance educational value but also to preserve site integrity by minimizing the need for physical installation of infographic. This blend of technology and heritage promotes cultural appreciation and boosts tourism, providing a modern bridge to the ancient world.

In the next future SUS test will be carry out, and after that the publication of the app could be performed, according to the management of the site and the municipality.

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