Chapter 10

A Framework Supported by Modeling and Virtual/Augmented Reality for the Preservation and Dynamization of Archaeological–Historical Sites

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ABSTRACT

This chapter presents an approach for the preservation and exploration of the archaeological-historical information using the most modern methods of Building Information Modelling (BIM) together with virtual and augmented reality adapted to archaeology. It was made a survey of the archaeological site using an unmanned aerial vehicle (UAV) and laser scan to obtain accurate information of existing structures which is stored in a BIM model. By using BIM methodologies, all existing information is organized in one place, shared and preserved for future memory. This 3D model is used to virtually reconstruct the Milreu archeological site, bringing this ancient Roman villa to life again, and supports the virtual reality platform and augmented reality tourism application for mobile devices, used for the promotion of the archaeological site, in an innovative way, in order to ensure a high degree of satisfaction to regular visitors and attract new public, looking for the visits to the archaeological-historical site to become a memorable experience.

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INTRODUCTION

The ruins of Milreu are a good example of a Roman villa of great archaeological importance (Santos, 1972), that is not immediately visible to the visitor without professional or specialized knowledge to directly get a correct idea of what that place would be like at the time.

This chapter presents an approach that enhances the preservation of information in a centralized system that allows exploration and valorization of all archaeological information.

This approach is supported by Building Information Modeling (BIM) methodologies allowing the integration of different types of archaeological information into a shared database, constituting a source of 2D and 3D information that is shared and exploited by visitors and/or specialists.

An unmanned aerial vehicle (UAV) conducts a topographical survey of the ruins of Milreu and thus obtain accurate information of the existing constructions, which is the basis that will allow the recording of all the existing information about Milreu. Such records include information about the interventions, interpretations and models of the different epochs.

Virtual and augmented reality technologies are integrated in the tourism application is used to improve the interpretation and the understanding of Milreu to the visitors, using mobile devices as an artifact mediator in the discovery of this archaeological site. Virtual 3D models of some spaces where historical-archaeological information exists were built to support the virtual and augmented reality platform for mobile devices. In this way, the visitor is able to explore a three-dimensional virtual environment on the web and on a smartphone or a tablet that helps him to interpret the archaeological site.

The creation of the virtual space of Milreu allows the visitor the interactive and immersive exploration in a 2D/3D environment presenting the history not visible directly from the archaeological site. In this way, the three-dimensional virtual reconstruction of the archaeological heritage reveals the importance of these places at the time to the general public by allowing, in an easy and interactive way, the visualization, understanding and exploration of these spaces through Internet.

On the other hand, when using augmented reality, the visitor obtains information superimposed on reality, when he is physically visiting the ruins of Milreu. Which helps him to read and interpret the different spaces, vestiges, objects and existing buildings and, in this way, to transform the visit into a memorable experience.

MILREU

The ruins of Milreu, located in Estoi, 7 Km from Faro, correspond to a Roman villa with a long period of occupation between the 1st century and 5th century, being one of the largest and best preserved Roman villa in the southwest of the Iberian Peninsula. It is classified as a national monument since 1910, after the excavations of the 19th century, carried out by archaeologist Estácio da Veiga, have revealed the archaeological importance of the site (Santos, 1972). From then, becomes a reference among the Portuguese archaeological sites, beginning a wide-ranging programme of excavations from de1971, coordinated by Theodor Hauschild. It is then that is definitely in sight the residential and richest part of the villa, the pars urbana, which was acquired by the State and is valued and converted into a visitable archaeological site. In this part, are to highlight the mosaics with marine motifs, the temple, the baths and the residential area organized around a peristyle and an atrium (Hauschild & Teichner, 2002; Lancha & Oliveira, 2013). The pars rustica, i.e. the part corresponding to the agricultural dependencies, stables