



## 3D IMAGING ANALYSIS AND DIGITAL STORYTELLING FOR PROMOTION OF CULTURAL HERITAGE: THE SCHOOL OUTREACH PROJECT OF REALMONTE

**ANÁLISIS DEL ESCANEADO EN 3D Y NARRACIÓN DIGITAL PARA LA PROMOCIÓN DE LA HERENCIA CULTURAL:  
UN PROYECTO DE GRAN ALCANCE PARA LAS ESCUELAS DE REALMONTE.**

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### Abstract:

This paper presents a work in progress carried out by the authors with the students of three high schools of Agrigento (Sicily, Italy) for the promotion of the cultural heritage of the city of Realmonte, near Agrigento. Through the combination of 3D imaging, storytelling and video production, the project aims to spread knowledge about the archaeological site of the 1<sup>st</sup> century AD Roman villa of Durruei, the Italkali salt mines and the natural site of the Scala dei Turchi.

**Key words:** virtual archaeology, 3d imaging, cultural heritage, experiential learning, Roman archaeology

### Resumen:

Esta obra presenta un trabajo en progreso llevado a cabo por los autores conjunto con los estudiantes de tres secundarias de Agrigento (Sicilia, Italia) para la promoción de la herencia cultural de la ciudad de Realmonte, cercana a Agrigento. Con la combinación del escaneo en 3D, narración de la historia, y la producción de video, el proyecto trata de divulgar el conocimiento de Durruei, sobre el sitio arqueológico de una villa Romana del primer siglo D.C., las minas de sal de Italkali y los sitios naturales de la Scala Dei Turchi.

**Palabras clave:** arqueología virtual, escaneo en 3D, herencia cultural, aprendizaje experiencial, arqueología romana

### 1. #ComunicaCultura: a school outreach project about the territory of Realmonte

This paper deals with the preliminary results of the educational project #ComunicaCultura fostered by the Superintendence of Cultural Heritage of Agrigento, in collaboration with external experts in 3D modeling and digital storytelling, within the framework of a 2015 school outreach program, named *School-Museum* and sponsored by the Sicilian regional Department of Culture and Sicilian Identity. Students of three high schools of the Agrigento area have been involved, in order to educate them to respect cultural heritage and to understand the importance of its communication and promotion.

Realmonte is a small municipality of some 4.500 people located about 15 kilometres west of Agrigento, in Sicily. The most popular tourist attraction of this area is the Scala dei Turchi, a rocky marlstone cliff by the coast,

famous for its white color and its staircase-shape, lying between two sandy beaches.

The other two main sites are the so-called Roman Villa of Durruei and the gigantic salt mines of Scavuzzo, still active and run by the company Italkali, extending for kilometres in the subsurface, well known for the cathedral carved by miners into the salt walls.

This project aims to make students aware of the wonders of their natural and cultural landscape and to contribute to the spread of that knowledge. The goal is to engage the students with experiential activities such as field studies, analysis of media related with cultural heritage and to guide them in the process of creation of short video clips, including screenplay conception, live footage, high quality pictures and 3D models.

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## 2. The Roman Villa of Durruei

The Roman villa of Durruei is one of the most significant examples of the material cultural output of the Early Roman Imperial period in Sicily. The villa is located on the western coast of Sicily, a few kilometers west of Porto Empedocles, the ancient commercial terminal of Agrigento. The villa is the only example of *villae maritimae* in all of Sicily, situated on the sea-shore. The discovery of the villa occurred in December 1907, during the construction of the railway line between Porto Empedocle and Siculiana. In 1908 an excavation directed by Antonio Salinas brought to light some rooms paved in *opus sectile* and *opus tessellatum*. Archaeological research was only resumed with two campaigns in 1979 and 1981, under the direction of the Superintendence of Agrigento, in collaboration with the University of Tsukuba, in Japan (Aoyagi 1980-1981; Fiorentini 1993-1994: 728-730; Fiorentini 2006).

Currently, the complex is made up of a residential block on the eastern side of the archaeological area, with several reception rooms opening onto a courtyard with a *peristyle* overlooking the sea, probably with an architectural monument, surrounded by a wall with cement running to the beach (Fig. 1). Analyzing the plan of the house (Fig. 2), five columns on each side of the square *peristyle* surround a wide open unpaved court interpreted as a *viridarium*, a sort of garden. On the north side of the *peristyle* is the entrance of the reception hall of the *dominus*, the so-called *tablinum*.



Figure 1: The peristyle of the villa from north.

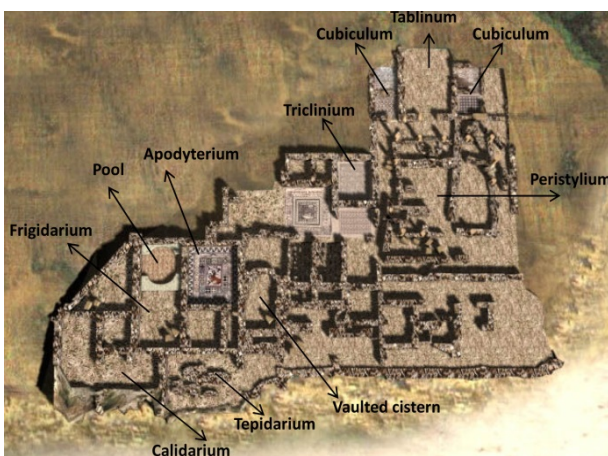


Figure 2: Axonometric plan of the villa with indication of the function of the rooms.

To the west of the residential area are the *termae* divided into two juxtaposed parts which also include a large oval pool whose walls were covered with marble slabs (Fig. 3). Each part consisted of a large room used as a dressing room, *apodyterium*, with a complex floor decoration, leading to the heated rooms, in which all the elements of the hypocaust system are still visible, such as the *suspensurae*, the ducts and the kilns (Fig. 4). A tank inserted between the two nuclei guaranteed the necessary water supply in both baths.

A large quadrangular room paved with two-tone black and white mosaic that includes touches of color limited to the figure of Neptune on the hippocampus can be found in the first part of the *termae*. The *apodyterium* of the second group is a large room paved with even more precisely constructed mosaic, depicting Scylla in the act of brandishing a rudder at the center (Fig. 5). Again the mosaic is two-toned, with touches of color reserved to the figure of Scylla. Remains of the marble facing of the walls, both in this environment and in the adjoining one with the floor in *opus sectile* and hot *frigidarium*, document the wealth of the *termae*. Based on the finds and especially the stylistic analysis of the floors in *opus sectile* and *opus tessellatum*, the architectural complex has been dated between the late 1<sup>st</sup> and the first half of the 2<sup>nd</sup> century A.D.



Figure 3: The pool of the *termae* complex.



Figure 4: Kiln and *suspensurae* of one of the heated rooms in the *termae* district.

## 3. The virtualization of the Roman Villa

After a few lectures on digital communication and documentation of cultural heritage, the students, supervised by external experts and by their own professors, produced 3D models of the most important rooms of the villa using both 3D scanning and Image



Based 3D modelling techniques, as seen elsewhere (Levy *et al.* 2012), in order to enrich the videoclips with engaging content. Sets of digital pictures of the peristyle, the western cubicle, the apodyterium with the mosaic of Scylla and the pool (Figs. 6 and 7) were processed with the software Agisoft Photoscan in order to produce 3D models. Furthermore, some details of the rooms, such as the kiln of one the heated rooms (Fig. 8) was acquired using the Occipital Structure sensor for Ipad. Subsequently, 3D models were processed and decimated with Meshlab and short clips of the models were created using Cinema 4D.



Figure 5: The apodyterium with the mosaic of Scylla.

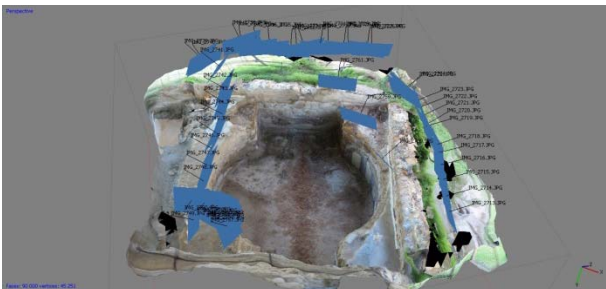


Figure 6: 3D model of the pool with indications of the camera positions from which pictures were taken.

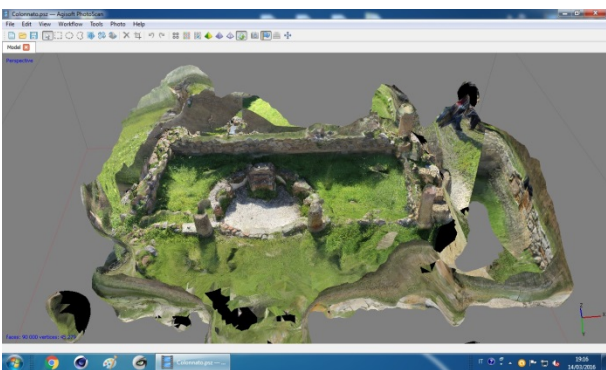


Figure 7: Unprocessed 3D model of the peristyle.

#### 4. Digital narrative and original script

The project being still ongoing, no content related with the Scala dei Turchi or the salt mines has yet been produced. However, 3D models of the altar and the pulpit of the cathedral carved in the salt walls of the mines have been generated (Fig. 9). Simultaneously to the gathering of the source material, students produced original scripts for their videoclips and, under the tutors' supervision, designed the related storyboard in order to arrange a proper production pipeline. The main theme of their scripts has been their generation compared with that of the elders of Realmonte in an evocative and emotional process of heritage knowledge in which the 3D reconstructions have become a real instrument of heritage promotion. The very first result has been a wide involvement of the students in the creation process of digital cultural contents in order to promote their territory. Students also revealed from the very beginning a good affinity with the devices and the 3D modeling techniques, understanding the meaning of the cultural creative process of user generated contents as a tool that is able to create forms of multimedia cultural dissemination. Finally, videoclips will be voted on in a video contest on YouTube at the end of the school year for the best advertising video about the cultural heritage of Realmonte.



Figure 8: 3D model produced with Occipital Structure sensor of the kiln in one of the heated rooms.

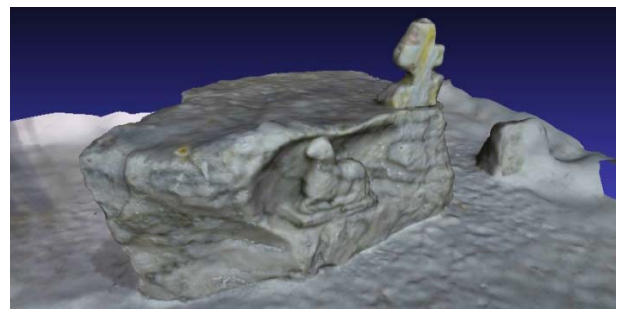


Figure 9: 3D model of the altar carved in the salt rock of the cathedral in the Scavuzzo mines.

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