

# Chapter IX

## Virtual Reconstructions in Archaeology

**Dimitrios Margounakis**  
*Computer Scientist and Researcher, Greece*

### INTRODUCTION

The rapid evolution of virtual reality (VR) in computer systems is one of the major technologies of our century. New ways of learning, living and working are on their way to be put on the map. virtual reality comprises an extension of static modeling, where the user can interact with a simulated environment. This type of computer modeling constitutes a major area of simulation in Archaeology. The new methods and computer practices allow the visualization and virtual reconstruction of artefacts, buildings, sites, landscapes and objects.

This chapter analyzes the computational methods used for recreating virtual worlds from the past. Terms, like *photogrammetry*, *rendering* and *digital elevation models*, are introduced and explained. The collaboration between archaeologists and computer graphics designers has to offer a lot to the wide spreading of cultural heritage by using innovative and appealing 3D technologies. In Section 1, several possible applications of virtual reconstructions in archaeology are

discussed. Section 2 presents the methods and techniques for recreating a virtual world, while Section 3 mentions some examples and related work on the field from literature.

### DIGITIZING THE ANTIQUITY

Technology advances have to show many admirable achievements. The continuously increasing computing power together with the multimedia applications of boundless capabilities is already offering a lot to archaeology, as well as other sciences. It is interesting to examine the ways of reviving the antiquity through technology and computers. Technology provides us today with the means to see pictures from the past, listen to sounds and music of another historical time, get known with our cultural heritage and interact with it.

The term “reconstruction” means here the recreation of some landscape, object, or situation by digital means. The physical reconstructions (e.g., the reconstruction of a tool from a previous

era by physical means, like wood) are absolutely different from the digital virtual reconstructions that are mentioned in this chapter.

Next, some cases of digitization of the antiquity are presented. All these cases are supported by multimedia applications (computer applications that contain text, images, sounds, animations and videos) and may be either 2-dimensional or 3-dimensional<sup>1</sup>. These applications could have a range from educational to entertaining character. Virtual reality (VR) models may lead to educational applications, didactic aids for heritage diffusion, or even helpful applications for scholars in order to address research issues.

### Landscapes and Archaeological Monuments

Pictures and representations from antiquity can be seen on a visual display unit. These particular reconstructions are based on today's salvaged monuments, the excavations and the archaeological research. The creation of exact representations (especially in cases of 3D images) on a computer

is a laborious process, because something that does not exist today should be visualized in many details, while most of the time the opinions of the specialists about them diverge. Techniques, which are used for such visualisations, are: 3D scanning, photogrammetry, and so forth.

### Situations – Events

Nowadays, the art of digital animation, as well as virtual reality, allows the live representation of occasions with the participation of virtual characters in the nature of animation, video, or even 3D virtual worlds where the user can actively take part. Fetes, ceremonies, rites, games and everyday life's moments from the ancient years come to life in front of user's eyes with photorealistic visualizations, movements and sounds. The resources of such applications lie on historical records and archaeological research. The latest trends of these applications are Virtual Cinemas, where the user interacts with the environment and resurrects moments of previous eras (Figure 1).

*Figure 1. Visualization of an event: Live scenario of Ostracism in ancient Athens within a virtual environment (Sideris, 2006)*



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