

## A VIRTUAL REALITY ARCHAEOLOGICAL FRAMEWORK FOR THE INVESTIGATION AND INTERPRETATION OF ANCIENT LANDSCAPES

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### ABSTRACT

Virtual Reality is gaining momentum and widespread popularity in the field of archaeology in order to support research, education, preservation and reconstruction of sites and objects of cultural, heritage and religious significance. The recent emergence of the Virtual Heritage Network has also promoted the use of VR and associated multimedia technologies in the field of natural and cultural heritage. In view of this, a framework is being constructed to assist archaeologists in the visualization, simulation and exploration of ancient landscapes that are otherwise inaccessible. This paper presents the early results of a 3D reconstruction of a true Mesolithic landscape in the years 10,000 – 7,000 B.P., based on real geo-seismic datasets gathered from the North Sea, structured according to a new, proposed framework for visualization and simulation in cultural heritage.

### KEY WORDS

Virtual Reality, Interactive 3D Environment, 3D Reconstruction, Archaeological Framework, Artificial Life

### 1. Introduction

Virtual Reality (VR) has been applied to many areas in the past [1-4]. As VR technologies rapidly advance through research and development in the arena of graphics and interactive media satisfying other human sensory channels (especially sound and haptics), the decreasing cost of computer hardware serves to open up new applications for simulation, such as preservation and exploration. Recently, The Virtual Heritage Network (VHN) [5] was launched as an international organization, promoting the use of technology for the education, interpretation, and preservation of natural and cultural heritage (as defined in [6]).

The term Virtual Heritage, or Virtual Reality for Heritage has been defined as “the use of computer-based

technologies to record, preserve, or recreate artefacts, sites and actors of historic, artistic, religious and cultural significance and to deliver the results openly to a global audience in such a way as to provide formative educational experiences through electronic manipulations of time and space” [4].

Efforts by the community of virtual heritage researchers to reconstruct sites considered worthy of preservation span from the historical “built environment”, including the Pyramids at the Ghiza plateau and the Virtual Reality Notre Dame [7], to natural heritage sites such as Australia’s Great Barrier Reef and the Virtual Everglades at Florida [8], other important efforts to conserve artefacts and educate visitors include Virtual Stonehenge [9], and archaeological relics recovered from different parts of the world [10-12]. Entire villages [13], cities [14-16] and even caves [17] were constructed as part of virtual conservation work. These digital reconstructions have, to date, contributed significant awareness and interest among the general public, providing educational benefits to concerned parties and new research opportunities to archaeologists and conservationists.

The research described herein falls within the broad study area of Virtual Heritage and sets out to recreate a unique submerged landscape [18] in the North Sea, as it existed 10,000 years ago by exploiting new forms of data, such as seismic and geological information. The discovery of the landscape prompted diverse questions relating to its existence between 10,000 to 7,000 years ago. The first of these questions is the appearance of the landscape and the vegetation that would thrive on its soil. More importantly, questions regarding the way ancient inhabitants would have been affected, in terms of their protection and food sources, by the environment’s natural transformation through vegetative growth, will perhaps shed light on issues such as the settlements constructed by early *hunter-gatherers* as their journeys progressed from what is, today, continental Europe to the British Isles. In this project, we are attempting to answer such questions by relying on the power of VR technology to support sensorily rich, interactive environments for









