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# Olympus VR

## Sediments of Information and Interaction

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*Abstract.* This paper discusses the design approach that was followed during the implementation of the mountain Olympus in a virtual reality environment. Due to certain limitations of data acquisition, time and asset management, the creation process demanded a hybrid approach in order to implement the environment of the virtual mountain as well as the supplementary levels of information and interaction. The immersive environment is represented with three scale versions which are enriched with additional layers of information, narration and interaction. These noetic 'sediments' provide an additional way for unique alloæsthetic experiences and enhance the ambiance of the mythical mountain, allowing a new dialogue between the user and the represented environment.

**Keywords.** *Virtual Reality, Game Engines, Representation, Digital Landscape*

### Introduction

Nowadays, in the second decade of the 21<sup>st</sup> century, virtual reality (VR) technologies are advancing fast and via big leaps. Recent improvements in head mount displays, graphics processors, motion sensors and body tracking algorithms are forming a technological landscape that offers new ways to perceive and interact with the represented worlds. (Rubio-Tamayo, Gertrudix Barrio and García García, 2017). Furthermore, the advancement of visualization software as well as the increasing popularity of game engines usage in the design and implementation of virtual spaces, have led to a renewed interest in the research of representational, immersive, interactive environments of any kind.

These digital environments constitute a category of multi-sensory media technologies that allow an intuitive interaction with spatial data, as they directly involve presence and human senses (McLellan, 1996). Moreover, they allow the mental registration of dynamic, experiential and mnemonic imprints, while redefying the concepts of identity, space and ambiance. The immersive exploration of such an environment can enhance the æsthetic and emotional experience of the represented space and provide unique, personalized narrations.

### The Virtual Olympus

According to this theoretical framework, the authors are conducting a research entitled *Use of game engines in the design and implementation of Mount Olympus in a*

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*virtual reality environment*, which is funded through a scholarship by the Stavros Niarchos Foundation. The main scope of this project is the exploration of the representational capabilities of the VR medium as well as the multi-sensory approach and understanding of virtual space that can directly reveal additional aspects of the design processes such as the comprehension of the represented information, the modes of interaction, the requirements of immersive ambiance conditions and the compositional elements of dominant narrations. These extra qualities and perspectives of virtual space, and especially the ability to immerse in it, are the main advantages of this methodological approach. Furthermore, virtual Olympus can broaden the significance and perception of an important Greek landscape and introduce it to a digital interactive study environment for a variety of applications such as the environmental, architectural and spatial design, tourism development, cultural heritage preservation, education, advertising, development of various entertainment products such as video games or in other areas of interest, where virtual reality and digital representation can be applied.

### *The Implementation of the Virtual Odel*

The basic condition that is met during the use of a virtual environment is the need for modeling and visualization, the simulation of various scenarios and conditions, the integration of any cultural, educational and historical elements or any other metaphors that are related with the area. In order to explore these requirements in a VR environment, we decided to utilize a game engine and more specifically the Unreal Engine 4.

The implementation methodology of the represented mountain included three distinct design stages (terrain data, surface textures and 3D assets) which concurrently constitute the primary layer of information and the creation process of the basic physical environment of Olympus. For the needs of our research, elevation data from the satellite system ASTER (Global DEM V2) were used. These height data are the most recent, free satellite data set with resolution of 30 meters per pixel.

### **The Scales and the Layers of the Representation**

An important condition that is met during the research of the Olympus digital environment, is the utilization of information and interaction layers which are successively added to the basic model and thus expanding its primary properties and capabilities. Usually, the degree of spatial and narrative immersion that is caused by virtual environments and the narrations that unfold in them, is high enough to convince that the digital space of Olympus is a new, “other” parallel space of existence and experience. In addition, given the fact that experience is an important factor of knowledge (Bot, Gossiaux, Rauch and Tabiou, 2005), we can consider that the digital representation of Olympus can be a new methodological approach during the dissemination of the knowledge, the cultural content and the affective experience of the mountain.

Consequently, the cultural heritage of any digital representation can be considered not only as a set of objects but also as a set of processes and practices that have the characteristics of a contemporary or previous culture and are highlighted through a variety of interpretive systems. Therefore, one of the biggest advantages in constructing virtual environments is the creation of dynamic representations that are transformed from simple representations of objects into simulations of cultural expressions and other related processes (Affleck and Kvan, 2005; Champion, 2002).

With all that in mind, the representational space of Olympus Mountain was divided

into three separate scales of representation and three layers of information, narration and interaction which are present - more or less - in every scale and concurrently constitute the dynamic elements of the model that can be altered or enhanced if needed. The macro, the meso and the micro scale of the mountain constitute different modes of representation in terms of size, view, movement, immersion and experience. The information, interaction and narrative layer of each scale can be considered as notional sediments that contain various elements of meaning and representation. These sediments “settle” consecutively on top of the primary landscape of the mountain while elements of each one of them may also be occasionally present in other layers. This way, a digital “stratigraphy” of experience and meaning is formed by the sum of all layers, which contributes significantly to the creation of a holistic, alloaesthetic, experiential layer. The description of each scale and the layers that have been introduced in them is as follows.

### *Macro Scale. The Mountain. Flying*

The macroscopic scale of the representation is related with the catholic, far view of the mountain. Olympus is visualized as a whole, solid landform, while the total acreage of the area of interest is approximately 900km<sup>2</sup>. The surface texture that is used is composed of many satellite aerial photo tiles that have been compiled together in a single texture. In this scale, the user camera moves freely above the mountain by using hand controllers and performs a “fly by” style movement. This mode allows the user to experience the geomorphology of the area, the location and size of the mountain, its juxtaposition with the sea and the rest of the nearby Greek landscape. In this representational version, the information layer serves mainly as a map due to the fact that contains the locations of geological, archaeological, historical and cultural points of interests. In this scale the user can also view the network of the main paths of the mountain and browse information such as the path’s length and height difference between start and end point, approximate travel time etc.

The landscape experience of the virtual mountain does not only originate from the simple depiction of the natural environment, but can also be seen as a form of spatial narration or narrative construction. As Griffero (2017) states “[...] forms, whether they are in a static or in motion, do not express merely apparent causal relations and pragmatic affordances but also tertiary qualities or sentimental (and therefore atmospheric) ones, which permeate the space in which they are perceived.” According to that, the user of a representation contributes significantly to the narrations that are produced by space and forms, while being the cause and occasion for new, often unprecedented actions and experiences. Hence, virtual Olympus becomes the spatial frame that hosts the “backstage” parts of a holistic experience, such as the individual interactions, spatial metaphors, noetic suggestions and environmental stimuli. These additional qualities and perspectives of virtual space and the ability of immersion and interaction are the novel elements that characterize the ambiance and the affective experience of the virtual Olympus Mountain.

### *Meso Scale. The Path. Walking*

In the mesoscopic scale of the VR environment, the paths of the mountain constitute the basic level of representation and immersion. Gortsia, one of the most popular paths that lead to Petrostrougga refuge, was chosen for an experimental implementation that would attempt to immerse the user in the physical environment of the forest which covers a vast area of the mountain and offer the chance to walk on a real path. The user in this scale can walk by using a first person view and a hybrid, phygital (physical+digital) type of movement. This movement is accomplished either by

walking in physical space (HTC Vive system allows for 25sq meters of free movement in a 5x5m area) or by performing the popular teleport “leap” that many VR environments use.

In this scale, the virtual paths of Olympus allow and enhance a new, expanded conception of cultural and ambient information about the mountain through the creation of experiential narrations and the procedure of walking (Loukakis and Papadopoulos, 2019), while at the same time consist a valuable tool for learning, researching and disseminating cultural heritage. The narration properties of this scale will also be enhanced with gamification scenarios inspired by the mythology and history of the mountain but also with additional texts of personal stories of visitors, hikers and climbers that were collected from various blogs, forums and online communities. The interaction layer of this scale involves the development of a typical treasure hunt game that takes places on Gortsia path. Also, at the end of the first part of the path, there is a glade where the user can play with virtual toys such as balls, dices, miniature figures, building blocks, wooden sticks and a piñata.

The use of new technologies and especially virtual reality in the process of highlighting and preserving the cultural references and all emergent ambiances can redefine the paths of Olympus as interpretive elements of a new, potential place and also increase the usefulness of interactive representation through virtual presence.

#### *Micro Scale. The Rock. Climbing*

The microscopic scale of the representation focuses on the interaction aspect of climbing and thus the corresponding layer is dominant. The basic calcareous bedrock of Olympus top and the force of gravity are the user’s opponents. More specifically the representation involves a climbing experience to the top of Olympus (Pantheon peak, 2917m) via a well-known steep route called Louki Corridor. The user starts at the base of the route and by using the first person perspective follows the signs that mark the way to the top. The simulation of climbing is achieved by using hand controllers. When the user has reached the top and touched the concrete pillar that marks the highest point of the mountain, the climate and ambient conditions are changed radically and the top of Olympus transforms to an “other” place. The landscape textures are removed, the heightmap is turned into a grid relief and then it is duplicated, reversed by rotation (180° around y axis) and placed on top of the original relief and parallel to it. In this way, the two reliefs are forming an hourglass shaped landscape which marks the beginning of a new experience of the mountain.

Hall (1997), studying the relationship between representations and culture, states that we interpret and signify things in the way we represent them, the stories we tell about them, the images of them we produce, the emotions we associate with them, the way we classify and conceptualize them, the values we place on them. He characteristically states that “Things ‘in themselves’ rarely if ever have any one, single, fixed and unchanging meaning. Even something obvious as a stone can be a stone, a boundary marker or a piece of sculpture, depending on what it means.”

According to this statement, the alloaesthetic layer that forms by the radical spatial and ambient changes transcends the mountain to an abstract, surreal space of action and experience. The events that occur in this version are similar to a hallucinating experience filled with changing colors and abstract sounds. The mountain that the user climbed is no longer Olympus. It can be any place or any mountain that is defined by his personal memories and experiences and allow a new idiosyncratic noetic dialogue between the user and the digital environment. A dialogue that is influenced by

the abilities and limitations of a virtual body but also by the digitally enhanced ambiance of Olympus.

## Conclusion

The virtual representations of cultural information and consequently the digital environment of Olympus Mountain are able to incorporate various elements during the documentation, synthesis and implementation of these environments such as additional information, enhanced visual and noetic translations and metaphors, idiosyncratic narrations and interactive additions of any kind. In this way they produce a new, non-consolidated and flexible digital object, which may remain open to analysis, further fragmentation and repositioning, reproduction through its use and finally its interpretation by the users. In addition, they are able to constitute an alloæsthetic reality of perception and understanding which allow for the common sharing and transmission of knowledge and meaning which incorporates and combines broader theoretical frames and practices with the contemporary virtual reality technology.

The representation of Olympus Mountain in a VR environment consist a digital implementation of an important natural monument of global heritage. Concurrently, enhances and transforms the perception of space to an alloæsthetic place by contributing to an innovating experience in a variety of ways (accurate or abstract representation of the synthetic elements, expansion and enhancement of human senses and abilities in VR, integration of various narratives, addition of mythological, geological, historical and cultural elements); but mainly due to the ability for active participation through interaction, in the creation and development of a new multiple narrative about the mountain. Each new interpretation of virtual Olympus is a personal mnemonic imprint, perception and experience of the represented elements, while maintains the primary metaphoric dimension of the representation. Virtual Olympus remains the Olympus of the 12 gods, of Pantheon peak, the climbers, the history and culture, but at the same time it transforms into a mountain of multiple metaphors and translations, interactions and idiosyncratic interpretations of each user.

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