Chapter 5
Software Requirements Definition Processes in Gamification Development for Immersive Environments

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ABSTRACT

The implementation of gamification in immersive environments is a complex and multidimensional process. A socio-technical approach is necessary to cover all the specifications that the system needs to satisfy the needs and the purpose of its genesis. The use of virtual reality (VR) technologies in mental healthcare associated with gamification mechanisms has been gaining popularity. Two projects were developed using VR, one that allows people to experience and better understand mental health conditions through empathy construct and the other can be used to help patients with social phobia or Arachnophobia to reduce their phobias using VR solutions and real-time biofeedback. The authors analyze the aspects that influence the development of immersive environments and gamification mechanisms and propose a socio-technical methodology based on actor-network theory for the survey and definition of requirements.

INTRODUCTION

Exposure to immersive environments can have different objectives, from the playful component, to impactful experiences, application to serious games and development of therapeutic programs. Whatever the purpose of the System to develop, there is one aspect in common, its complexity. Thus, designing and developing such a system is a great challenge, not only technological, but above all, in terms of being able to properly exploit its full potential.

Gamification in healthcare implies the involvement between people and technology, creating a socio-technical system in which the different elements interact and influence each other. This chapter analyzes the aspects that influence the development of immersive environments and proposes the use the Actor-Network Theory (ANT) as methodology for the survey and definition of requirements.

Implementing gamification in an immersive environment is a big challenge, involves making important decisions that have a decisive influence on the results to be achieved. The analysis and specification of requirements for such a system is a complex process, and should consider some aspects such as, to whom it is intended, interactivity, hardware, the type of suitable immersive environment (VR, MR, CAVE, Video 360º), real-time biofeedback measurement devices, the interactive narrative, the objectives, the results, report, surrounding space, among others.

IMMERSIVE ENVIRONMENTS FOR EMPATHY CONSTRUCT AND SELF-CONTROL MECHANISMS

Immersive environments create impactful experiences and have great potential to generate emotions that increase the degree of empathy. Real-time biofeedback allows to assess users' reactions to the environment to which they are exposed. Emotions are part of the empathy process, of the complex ability to share the affective state of another individual (de Tommaso et al., 2019; Santamaría-García et al., 2017).

When a system is developed to generate an immersive environment to create emotions, it makes sense to incorporate art elements to enhance its effect. The art in immersive environments influence the individual process that increases the person's receptivity to the construction of emotions.

Stimuli induce emotions, and emotions trigger personalized reactions, each reaction is personal and occurs in a specific spatial, temporal, and circumstantial context. The same stimulus can give rise to different emotions, in different people, or even in the same person at different times (Paulo Veloso Gomes et al., 2019).

Immersive environments explore multimedia potential, the use of multiple devices and different types of multimedia produce different stimuli and induce different emotions, contributing to the audience's involvement (Soleymani, Larson, Pun, & Hanjalic, 2014). Some art projects use EEG (Electroencephalography) as an input to produce or modulate artistic content, such as animations, music and choreography (Grandchamp & Delorme, 2016). Neurofeedback allows the voluntary regulation of brain activity. Its application intends to enhance and recover emotion and cognitive processes, and their underlying neurobiology (Lorenzetti et al., 2018).

The exposure of an individual to an immersive environment generates emotions, emotions trigger feelings, which in turn, promote actions (Paulo Veloso Gomes et al., 2019).

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