Chapter 6
Gamification: Model–Driven Engineering Approaches

Pedro Aguiar
https://orcid.org/0000-0003-1356-0210
Instituto Superior de Engenharia do Porto, Instituto Politécnico do Porto, Portugal

Isabel Azevedo
Instituto Superior de Engenharia do Porto, Instituto Politécnico do Porto, Portugal

ABSTRACT

Gamification has been applied in diverse areas to encourage participation, improve engagement, and even modify behaviors. However, many gamified applications have failed to meet their objectives, and poor gamification design has been pointed out as a recurrent problem, despite a growing number of gamification frameworks and their valuable guidelines. Model-driven engineering approaches have been proposed as possible solutions to the deficient, and incoherent, inclusion of several dynamics and mechanics. They allow achieving a formalism that can avoid many errors and inconsistencies in the process. Moreover, these efforts are necessary to achieve a conceptualization of gamification that facilitates its inclusion in applications. Three proposals are analyzed, all based on domain-specific languages (DSL), which allows users to design complex gamification strategies without requiring programming skills. The MDE approach can be used to enrich gamification design by providing a platform that involves various concepts and the necessary connections between them to ensure harmonious designs.

INTRODUCTION

Games are not just about entertainment, not now, nor over the years. America’s Army game series, for instance, included the AA game (Land & Wilson, 2006). It was designed to increase recruiting and values such as loyalty, and honor, and was “the first successful and well-executed serious game that gained total public awareness” (Djaouti, Alvarez, Jessel, & Rampnoux, 2011). Soon game aspects attracted the attention of developers in an attempt to have its benefits in other applications as well. The classic
definition of gamification is the use of design elements characteristic of games in non-game contexts (Deterding, Dixon, Khaled, & Nacke, 2011).

This chapter addresses gamification, introducing its various definitions provided by different authors, as well as comparing and contrasting the views reflected in each of them. The problem of gamification not achieving certain established goals due to poor design is also analyzed along with some possibilities to address it, such as gamification-related guidelines provided by many frameworks.

The solutions present in this chapter follow a Model-Driven Engineering (MDE) approach in combination with Domain-Specific Languages (DSLs), providing domain experts a platform to develop gamification strategies. The following section contains background information about what gamification is, relevant frameworks for the development of gamification in systems, and an introduction to MDE and DSL.

The main objective of this chapter is to discuss and disseminate an alternative, and less widely used, method of formalizing gamification strategies. Through this method, domain experts can aggregate various factors present in a DSL to develop harmonious solutions that can later be integrated into the desired system.

In the remainder of this chapter, gamification concepts and applications are explored in its second section (“Background”). In the third section, an analysis is performed on some of the researched frameworks, followed by a section dedicated to MDE approaches in gamification. The final section explores the future of gamified applications and the role of MDE.

BACKGROUND

Gamification has been explored by various authors, and thus different definitions have been provided. These definitions are presented and compared in this section. Furthermore, to showcase what gamification can offer, some examples of successful applications are analyzed within this section, as well as examples of applications that did not produce the expected results.

DEFINITIONS

The first definition to be analyzed is: “Gamification is the use of game design elements in non-game contexts” (Deterding et al., 2011). The authors justify their definition by emphasizing the following words:

- Game.
- Element.
- Design.
- Non-game contexts.

For the keyword “game”, the authors began by clarifying that gamification was related to games, but not related to “play”. The concept of games being a subcategory of the broader category “play”. Then the authors proceed to explain that games are defined by explicit rule systems and competition between actors of those systems towards goals or outcomes. The concept of gamefulness is described as a “systematic complement” to playfulness. Furthermore, this is due to gamefulness relating to the qualities of gaming over the qualities of playing.