Agile Software Development Process Applied to the Serious Games Development for Children from 7 to 10 Years Old

Sandra P. Cano, Universidad del Cauca, Cauca, Colombia
Carina S. González, Universidad de la Laguna de Tenerife, La Laguna, España
César A. Collazos, Universidad del Cauca, Cauca, Colombia
Jaime Muñoz Artega, Universidad Autonoma de Aguascalientes, Aguascalientes, México
Sergio Zapata, Universidad Nacional San Juan, San Juan, Argentina

ABSTRACT

The development of video games is a complex, multidisciplinary process, which involves different areas as well as a greater number of roles than for traditional software. Serious games face process constraints that concern a number of interactive, educational and psychological factors designed to lead to the fulfillment of educational objectives within a specific context. Based on a case study in the city Cali, Colombia, an iterative and incremental process is proposed, focusing on small and medium development for educational serious games and basing itself on two lines of research: agile development methodology and user-centered design (UCD) for children from 7 to 10 years. The agile methodology eXtreme Programming (XP) offers a useful option for the development of serious games as it establishes a continuous communication with all project stakeholders - including the end user - throughout the project, while UCD allows the user profile to be known and identified so that the game will meet the needs and match the capabilities, expectations and motivations of the child.

Keywords: Serious Games, Agile Software Development, eXtreme Programming, Software Engineering, User-Centered Design

INTRODUCTION

Software engineering has an important role to play in development as it offers the methods and tools for developing and maintaining quality software (Jacobson & Booch & Rumbaugh, 1999). The development of a video game can therefore be considered a software application, with the difference that it involves more activities and roles within a development team com-
pared to traditional software. More restrictions require to be confronted in the process than for a traditional game. This involves a variety of interactive and educational factors that should lead to fulfilling educational objectives in a given context.

A serious game is defined as having an educational purpose, making quite clear that it is not played primarily for fun (Padilla, 2011); it allows participants to experience, learn from their mistakes, and safely gain experience. Several investigations (Gonzalez & Blanco, 2011; Lasse, 2011; Thomas, 1982; Conor et al., 2011) have attributed importance to video games as educational software that can foster a range of skills and development capabilities in children’s learning, such as social skills, attention improvement, decision-making, vision-motor coordination, and reasoning.

Information and Communication Technologies (ICT) are transforming education and in this regard video games offer an alternative for generating meaningful experiences in children’s learning. In addition, studies have been done where development methodologies have been adapted for video games, with the aim of obtaining greater benefit with respect to the product under development.

Agile methods are currently being used by video game development companies. This has enabled projects to be delivered very quickly, with delivery times being improved iteratively. Agile methodologies require a highly collaborative and self-organized teamwork involving each of the project participants, and include the user as a participant (Patton, 2002). They allow a rapid way of meeting the needs of the user and providing continuous “feedback” about the game interface. As such, it was decided in this work to adapt some UCD activities within the iterative process of the eXtreme Programming (XP) agile methodology, thereby providing support for establishing continuous communication between all participants in the project and enabling rapid development of serious game in the education field.

The approach consists of several stages which are iteratively executed: requirements analysis, user analysis, prototyping and evaluation. UCD is specified in ISO 13407 – Human Centered Design Processes for Interactive Systems (ISO 13407, 1999). It is both a broad philosophy and variety of methods, but the important concept is that users are involved in the entire process (Abram, Maloney-Krichmar & Preece, 2004). In this sense, the roots of User Experience Design (UXD) (Roto et al., 2011) can be found in the principles of Human Centered Design, which can be summarized as:

- Positioning the user as a central concern in the design process
- Identifying the aspects of the design that are important to the target user group
- Developing the design iteratively and inviting users’ participation
- Collecting evidence of user-specific factors to assess a design

In principle, UXD is not different from UCD (Roto et al., 2011). However, UXD adds important dimensions, such as User Experience (UX) factors (Larsen, 2008). While traditional usability factors were largely related to performance and smooth interaction, new UX factors relate to affect, interpretation and meaning. Some UX factors, such as social and aesthetic aspects, are likely to be very different in character from the traditional concerns (Constantine, 2002). This presents UX practitioners with significant challenges in terms of identifying which UX factors they need to consider when embarking on a design project. In any case, it is usual that a design team will only be able to deal with a few critical UX factors that influence the suitability of the design for a typical usage situation. Consequently, a big challenge for design teams is to make sense of the available information during the early phases of the UXD process.

In this paper, an iterative and incremental process is proposed, with a focus on small and medium development for educational serious games and based on two lines of research: agile development methodology and User-Centered Design (UCD). In Section 2, research work is
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