An Approach to Assess Knowledge and Skills in Risk Management Through Project-Based Learning

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ABSTRACT

The increasing demand for Software Engineering professionals, particularly Project Managers, and popularization of the Web as a catalyst of human relations have made this platform interesting for training this type of professional. The authors have observed the widespread use of games as an attractive instrument in the process of teaching and learning. However, the project of a web-based instructional game that fulfills all pedagogical and technical requirements for training a project manager is not a trivial task. A gap exists between the theoretical concepts that are normally learned in traditional courses and practical aspects required by the real tasks. As such, this paper proposes the use of a persistent browser-based game intended for Risk Management as a component support in the qualifying process of new professionals of Project Management. The game provides to the player some experience in a real context of Project Management, in which new challenges are frequently posed to the enterprises.

Keywords: Intelligent Agents, Persistent Browser-Based Games, Project Management, Project-Based Learning, Risk Management, Serious Games, Software Engineering

INTRODUCTION

The importance and the real needs for the adoption of methods and principles of the Project Management (Project Management Institute, 2004) in organizations are currently widely discussed and accepted. In such organizations, the main role of the Project Manager is conducting a project to its successful conclusion. However, that is not what usually happens in software projects (Brewer, 2005; Gonzalez et al., 2011).

In an attempt to explain the high number of projects that fail due to reasons related to bad management, some studies have discussed a
possible relationship between the lack of certain abilities by managers and the traditional teaching methods. This is one of the consequences of acquiring knowledge without experience in some real project or complementary educational approaches, such as games and simulations.

In order to suggest a solution for this deficiency, in this paper we propose a tool to provide a new way of learning that is not only attractive, but efficient and collaborative as well. This tool meets the needs of users with distinct routines and schedules. This paper proposes the eRiskGame tool, which is a Persistent Browser-Based Game for educational purposes. The game is about the tasks that a Project Manager must perform in an organization. Its focus will be on Risk Management, more specifically in the Planning, Control and Monitoring (budget, time schedule and software quality).

This serious game uses Project-Based Learning – PBL (Ayas & Zeniuk, 2001; Mitchell et al., 2008) to bring the player a way to acquire knowledge on project management, particularly in the risk control involved in this process. To that end, intelligent software agents were employed in monitoring and controlling the environment, which is in constant change and affects the professionals, the organization and its customers.

This paper is divided into eight sections. In the next section, an overview of risk management is presented, followed by a description of the use of PBL in software engineering. The concept of persistent browser-based games and application of intelligent agents in computer games are then presented. Related work is also discussed, as well as the agent-based approach proposed and the role of each agent. The last section presents our final remarks.

**RISK MANAGEMENT**

Risk management is increasingly seen as one of the main jobs of project managers. It involves anticipating risks that might affect the project schedule or the software quality of the software being developed and taking measures to avoid or mitigate the impacts arising from those risks (Hall, 1998; Ould, 1999) _apud_ (Sommerville, 2006). So we can understand risk as an unwanted event that has negative consequences (Pfleeger & Atlee, 2009).

In a software project, various risks may exist and they are best understood if we divide them in three categories (Sommerville, 2006): _Project Risks_, which affect the project schedule or resources; _Product Risks_, which affect the quality or performance of the software being developed; _Business Risks_, which affect the software developing or procured by organization. Therefore we can identify particular risk implications in the projects and plan how to deal with these risks if they will or may occur.

Project managers are subject to uncertainties related to the difficulty of defining requirements, time and resources estimating or even to organizational or customer needs changes. To avoid that these risks jeopardize the project, the manager must anticipate them, understand their impact and take the appropriate action. This process consists of four steps (Sommerville, 2006): 1) Risk Identification, in which possible project, product and business risks are identified; 2) Risk Analysis, in which the likelihood and consequences of these risks are assessed; 3) Risk Planning, in which plans to address the risk by avoiding it or minimizing its effects on the project are drawn up; and 4) Risk Monitoring, in which the risk is constantly assessed and plans for risk mitigation are revised as more information about the risk becomes available.

Risks can have different impacts and occurrence probabilities, therefore different strategies must be followed to manage them. A preventive strategy requires that measures to reduce the likelihood of a certain risk to affect the project are taken. However, many risks cannot be avoided. A minimization strategy implies taking measures previously to soften the impact of risk if it occurs. A contingency plan must also exist to deal with the problem if it cannot be avoided.
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