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Implementation of a risk management simulation tool

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Abstract

Risk management is an essential part of project management. Proactive management of risk in projects helps increase the success rate of projects and the reduction of potential costs. The paper presents a new tool for implementing the risk management process in projects. The tool allows participants to understand a project further, and to analyse risks in a project using various methods such as risk exposure and Monte Carlo method. From the results of the study, the tool helps in improving the understanding and implementation of risk management in projects. The tool implementation and results are discussed in this paper.

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1. Introduction

A risk is “*an uncertain event or condition that, if it occurs, has a positive or negative effect on one or more project objectives*”¹. Mitigating risk in a project increases the likelihood of success in that project. Tsiga et al. ² have highlighted the importance of risk management in projects. The management of risk can prove to be difficult for

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inexperienced project managers. This can have a knock-on effect on the delivery of a projects with respect to its objectives³.

In general, the risk management process consists of 6 phases⁴. These procedures are incorporated into a project and are performed iteratively until the end stage of the project lifecycle. Various techniques and tools are continuously being developed with the aim of supporting and enhancing risk management activities.

Risk management techniques have always been incorporated into projects, but a large majority of projects still surpass initial cost and time estimates⁵. Various tools have been developed from academia to better understand this and to support in the management of risk. Such tools include SCRUMIA⁶, SimSE³ and ARMI 2.0⁷.

ARMI 2.0⁷ is a piece of risk management software that educates players on the risk management process. The participants are grouped into teams where each team makes decisions based on a limited budget. The tool provides gamers with an already established set of risks that could occur in IT projects. It randomizes the possibility of a risk occurring in a project and each risk has a predefined cost on the hypothetical project. The aim of the game is to help the participants minimize their expenses during a project. On the other hand, SimSE³ and SCRUMIA⁶ are games that focus on teaching the technical elements of software development without highlighting risks and their importance.

The current tools provide insights on risk management and its element, but they tend to focus on software development and do not provide sufficient focus on risk and its management in generic projects. These tools tend to be more of a teaching exercise and are difficult to incorporate into real life projects. Tsiga et al.^{2,8} have highlighted the importance of risk management in projects and the need for a tool that eases understanding and implementation of risk management in projects.

The risk tool introduced in this paper provides a solution for this. The tool is built in a way that helps the user to identify the type of project they are working on and give some suggestions on how to accomplish such a project. It also provides templates for standard risk registers that calculate probabilities and causes. The tool then goes further by allowing users to perform various risk simulations on all or partial lists of the identified risks in the table.

2. Methodology

In building the risk management tool, an iterative approach was implemented. This allowed the tool to be built in chunks and eased the development process. Various software development packages were used during the development process. The tool was developed using the Java development kit to handle the back-end logic and HTML to handle the front-end interface and to display the results. The tool implementation is discussed further in Section 3. The tool employs the Obeng project classification⁹ to help users in further understanding their projects and various quantitative risk assessment methods such as the risk exposure¹⁰ and the Monte Carlo simulation¹¹ methods.

Once the application was completed, it underwent various testing to ensure the integrity and quality of the software. The tests carried out on the tool include unit, integration and system testing. After these tests were completed, the tool was trialed with project participants in the petroleum industry. This trial was carried out in a closed room meeting with 21 project participants. The entire process of introducing the tool and demonstrating it took approximately 2 hours. Once completed, the participants answered a quick questionnaire designed to get their perceptions of the tool.

3. Tool implementation

The tool is designed to allow users to run the application easily from any internet browser, and this was done to ensure compatibility with different operating systems. Once users execute the application, they have the capability to run through it. Figure 1 shows the context diagram of the risk tool from the user's point of view.

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