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Committee for Student Affairs
Univerza v Ljubljani, Fakulteta za računalništvo in informatiko
Večna pot 113, 1000 Ljubljana

The master's thesis topic proposal
Candidate: Marko Prelevikj

I, Marko Prelevikj, a student of the 2nd cycle study programme at the Faculty of Computer and Information Science, am submitting a thesis topic proposal to be considered by the Committee for Student Affairs with the following title:

Slovenian: **Vodenje projektov na podlagi analize podatkov**
English: **Data Driven Project Management**

This topic was already approved last year: **NO**

I declare that the mentor listed below has approved the submission of the thesis topic proposal described in the remainder of this document.

I would like to write the thesis in English with the following reason: I am a foreigner and therefore have more experience with writing in English.

I propose the following mentor:

Jure Demšar, doc. dr.
University of Ljubljana,
Faculty of Computer and Information Science
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Ljubljana, 25. november 2019.

Proposal of the masters thesis topic

1 The narrow field of the thesis topic

English: project management, task workflow analysis, data analysis

Slovene: vodenje projektov, analiza poteka dela, analiza podatkov

2 Keywords

English: agile project management, project management information system, quantitative data analysis, project success, performance metrics, causality analysis

Slovene: agilno vodenje projektov, informacijski sistemi za podporo vodjenje projektov, kvantitativna analiza podatkov, uspešnost projekta, metrike uspešnosti, analiza vzročnosti

3 Detailed thesis proposal

Past approvements of the proposed thesis topic:
The proposed thesis has not been submitted nor approved in previous years.

3.1 Introduction and problem formulation

Project managers (PMs) are responsible for leading their teams towards successful completion of the project's objectives [1]. Project Management Information Systems (PMIS) are used by PMs to assist their decision making for planning, organizing and controlling projects [2]. PMIS keep the state of projects and present it to PMs via simplistic reports and visualisations, such as burn-down charts and Gantt charts. Unfortunately, these visualisations offer only high-level metrics such as story points completed, the status of deliverables, etcetera [1]. A high-level overview of the progress is unsatisfactory for PMs and causes poor decision making [2]. That forces them to perform additional data analyses. The PMIS does not provide the aforementioned additional workload, but it certainly required to increase the quality of the decisions.

3.2 Related work

PMIS usage is a common and widespread practice across enterprises. PMIS have a direct impact on project success because they provide a structured overview of the project's state and support the decision making the process of PMs [3]. Contemporary PMIS provide organization-wide transparency. Their usage is not limited only to PMs but widespread over the majority of the organization's members. This is particularly important in agile environments, where all members need to track their progress on their own. Agile project management has been on the uprise ever since the appearance of The Agile Manifesto [4] mainly because it has shown its worth in practice. The success rate of agile projects is usually much greater in comparison to more traditional project management approaches [5].

We aim to improve the general usability of contemporary PMIS which agile projects use. One of the most common agile approaches nowadays is SCRUM, which specializes in achieving software agility [6]. An example of such a PMIS is Atlassian's JIRA, one of the most widespread solutions for tracking and managing agile projects, mainly focused on software development. With JIRA, we have the unique advantage of observing users' habits when using the PMIS by examining the history of their actions: how often they interact with the PMIS, what they edit, which workflow elements they are commonly working on, and so on.

Examining the history of the users' interactions with the PMIS we expect that we will be able to perform an analysis of the causality of a user's actions and try to identify the possible bottlenecks which are preventing the projects from moving forward. Serrador et al. brought up a concern that SCRUM projects are susceptible to potential risk [7] because they do not have a specific process of risk management application, even though it is vital for the success of the project. Toole [8] has performed similar research where he was able to classify whether a particular performed action had a positive or a negative effect on the project.

3.3 Expected contributions

Our first contribution is the validation of the hypothesis that applying modern data analysis techniques to information generated by a contemporary PMIS can help us extract insights from which the underlying enterprise will benefit.

Under the assumption that our hypothesis is confirmed, our second contribution will be a prototype of a Project Management Support Tool (PMST) which will offer functionalities for optimizing the workflows in the projects and identifying various outlying project elements such as under- and over-performing users, very complex tasks, etc.

3.4 Methodology

To achieve our expected contributions, we will analyse data from a contemporary PMIS, which is provided by Celtra. Their PMIS of choice is JIRA, which is used daily to keep track of their project's progress. Furthermore, JIRA has an open API for accessing the underlying data, which allows easy extraction.

Data cleansing, i.e. ETL pre-processing, of the data is required upon exporting it, to prepare it for further analysis. We intend to validate our hypothesis by applying various methods, predominantly from the fields of statistical modelling (life-cycle comparison of different types of tasks) and network analysis (exploring the interconnectedness of users), and their combination (uncovering the causality of the actions). Finally, in the case of successfully validating our hypothesis, we will develop a prototype PMST in the form of an application which will enable us to use our methodology in real-world projects.

3.5 References

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[8] T. M. Toole, A project management causal loop diagram, 2006.