Chapter 54
MMT: A Tool for Observing Metrics in Software Projects

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ABSTRACT

This paper presents the Metrics Monitoring Tool (MMT) that was developed in university graduate and undergraduate courses on software project work in 2014-2016. The tool aims to support project members, project managers and upper management in reporting and monitoring software and project metrics for their easier and more effective utilization. The paper covers the development process of the tool, evaluation assessment, its current composition and features. The paradigm applied in this study is Design Science Research and the methods for evaluation include prototype, expert evaluation, case study and technical experiment. Data was collected from the tool users by two questionnaires. As a result, MMT was evaluated to ease the metrics handling, while several aspects related to the richness of functionalities and usability still require further development.

INTRODUCTION

This article extends the paper MMT – a Project Tool for Observing Metrics in Software Projects (Mäkiaho et al., 2016).

Project work and basic project management skills are essential to all computer science students (Computer Science Curricula 2013, 2013). In many universities, group work skills are learned as a part of different course assignments starting from the first year of studies. During the third or fourth year, when students have studied enough core courses, there can be a larger capstone project as a stand-alone course.

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In addition to group work and communication skills required in the capstone project, students have a possibility to combine their knowledge from different courses, like programming, databases, software and user interface design, into practice when they implement a software product. The student teams need to find a suitable combination of software tools (Portillo-Rodríguez et al., 2012) to utilize in the project for programming, requirements management, communication, user interface design and other main software development activities.

When course staff organizes different capstone projects to a larger group of students, there are challenges in following and supervising many projects at the same time. The projects also generate many standard metrics: whether a specific deadline was met or not, whether a specific deliverable was returned on time, how many hours of work has been done so far by different students, etc. Then, depending on the field of study, there can be many other process and product related metrics. In software development projects, there can be metrics like the number of written code lines, number of planned features to be implemented, number of features under development at a given moment, number of implemented features so far, number of passed test cases, etc.

The motivation for developing the Metrics Monitoring Tool (MMT) originates from the University of Tampere Project Work (PW) and Software Project Management (SPM) courses. During the courses, undergraduate PW students act as software development team members, and graduate SPM students act as project managers for those teams. The overall objective of the teams is to design and implement a functioning piece of software for a real client during one semester.

Prior to implementing MMT there were several challenges related to collecting and monitoring student projects' metric data. The metric data was gathered by using weekly reports submitted by project managers via a text based email template. The main challenges in this conduct included the high amount of manual work of project managers in aggregating the metric data, inconsistencies in and varying formats of the submitted data, lack of visibility to projects' overall progression versus their goals, as well as limited visualization capabilities.

The authors wanted to create a tool to help students to report their progress and to see the state of their projects by using project metrics. The aim was also to help the course supervisors to more easily see the progression of multiple projects. Thus far, the authors have not found any existing tool to fill with the requirements mentioned above, which would not force the use of some particular project management tool, and which can be used web-based.

This paper presents the tool that was created as a solution to these issues; MMT is a software for observing and visualizing project metrics in software development projects. The tool helps project managers in reporting, team members to be more aware of the state of the project and the course staff to compare and follow how all projects are progressing. The requirements did not include the features of a typical software project management tool, like project planning and scheduling, resource allocation or change management. Thus, the MMT-tool cannot be called a project management tool and that is the reason, why the authors do not compare it to the common project management tools, like JIRA or Redmine. Based on the research needs, for example, the tool can be extended to collect new data in future. The authors present here the evolution process of the tool from the proof of concept version to the current version that is in production.

The rest of the paper is organized as follows. In the next section, a brief introduction to software project metrics is given. The Methods-section tells how the Design Science Research (DSR) -paradigm (Hevner et al., 2004) was applied to this research. Then, the development process and the implementation of MMT is described. After that the evaluation phases are introduced. The final section concludes the work.