ProjectTales: Reusing Change Decisions and Rationales in Project Management

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Abstract

Changes are inevitable in project management and project managers are often required to make change decisions that may have significant effects on the success of the project. To support project managers' decision-making process in such common cases, we have designed and developed a tool called ProjectTales. This tool takes advantage of the valuable information buried in the history of projects and provides various visual and interactive representations of the previous changes. Using ProjectTales, project managers can explore the history of projects, find the change situations similar to their current one, interpret the impact of the change decision, and potentially reuse the decision and the rationale of the change. We are currently planning a user evaluation to compare our tool with a baseline system.

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1   Introduction

In the las few decades, many software programs have been designed and developed to address various aspects of project management such as estimating a project's effort (Peischl, Nica, Zanker, & Schmid, 2009), managing collaborative activities (Zhang, Zhao, Moody, Liao, & Zhang, 2007), and monitoring projects' changes and risks (Smith, Bohner, & McCrickard, 2005). In this study, we are interested in assisting project managers with making effective project-related change decisions. Projects are not conducted in vacuum and are normally affected by different dynamic factors such as availability of budgeted resources, level of priority in the organization, and project members. Hence, it is expected that project managers commonly need to make modifications to projects during the management process.

Researchers have explored computer supported means of helping project managers to make valid decisions when projects need to be adjusted to the new situation. For example, Karvonen (1998) presented a computer supported management process to illustrate how computer systems could support project manager's decision-making in a change situation during a delivery project as well as in the continuous business process improvement of a company. Sauve et al. (2008) presented a method to evaluate the risk exposure associated with a change to be made to the infrastructure and services in IT service management. With the risk exposure metric, this method automatically assigns priorities to changes.

Our approach supports project managers in making change decisions by presenting interactive visual representations of the change history of the previous projects. Our assumption is that when facing a change situation, project managers may make more effective decisions if they are aware of rationales and decisions of the previous projects that correspond to the similar situations as well as the impact of those decisions on the projects. Therefore, our design of the interactive visualization tool has focused on presenting and making associations 1) among the history of previous projects' changes, their causes, and their decisions' rationales; and 2) between the decisions and the project status as an indicator of the decisions' impact on the project. In this poster paper, we describe our current prototype system, ProjectTales. In the remaining

sections, we first discuss related work and then present the design rationales of the prototype. We conclude with our user evaluation plans and a summary of the research.

2   Related Work

After surveying project management tools such as TeamSpace and TeamSCOPE, Smith et al. (2005) proposed design guidelines of a project management tool for distributed design teams. They argued that to facilitate reuse of project management knowledge from previous projects, it is important to archive both projects' product knowledge and their process-related knowledge. To illustrate their configuration approach of project management information systems, B̄erziša and Grabis (2011) presented how knowledge of previous change requests can be combined with a request in the current project. In their approach, a request has two configurations in the system: the attributes of the request (e.g., priority, description, remaining, due date) and the status workflows (e.g., closed, open, agreed). When a request is made in the current project, the system will provide suggested descriptions of the attributes and status workflows based on the previous projects, i.e., the project management knowledge repository.

Compared to the system presented by B̄erziša and Grabis (2011), which facilitates the configuration of current changes based on the history of previous projects, our system focuses on facilitating project managers decision-making process using the change knowledge from the previous projects. In addition, we use interactive visualization techniques to let project managers browse and extract change information relevant to the current project situation and to reason the association between the changes and their impact on the projects. We discuss our prototype in more details in the next section.

3   ProjectTales: An interactive visualization tool

3.1   Database and Its Design Rationale

Our prototype, so called ProjectTales, is designed and built upon the open source software EGroupware's (http://www.egroupware.org/) history database. EGroupware is intended for businesses to manage contacts, appointments, projects, and to-do lists. It is an actively used software program with a reliable user reputation. For example, its user rating is 4.2 out of 5 on SourceForge.net (164 votes), and on its enterprise collaboration website, there are 9352 topics and 27071 posts for EGroupware users' discussion forum as of Sept. 13, 2013. We thus understand that EGroupware's history database has been widely accepted and used in real-world project management cases, and so we used it as the underlying database for ProjectTales. EGroupware's history database provides diverse attributes for projects (e.g., title, description, priority, used budget) and several attributes for changes (e.g., project, changed project attribute, timestamp). We modified this history database to include the causes of the changes. With the causes available to project managers, they can easily retrieve the change decisions that correspond to the same causes as the current situation. When modifying a project, project managers are asked to assign one or more causes to the change. These causes can be selected from a pre-specified list of potential causes extracted from the literature (Dvir & Lechler, 2004; Steffens, Martinsuo, & Artto, 2007; Wu, Hsieh, & Cheng, 2005), including the external causes (e.g., political, economic, customer needs, market force) as well as the internal causes (e.g., staff or budget shortage, strategic decisions, quality control). In order to allow project managers tailor the causes to their specific organization situation, they are allowed to add new ones to the list.

Arguing for the importance of providing the change rationales to the project manager, we also included this information in the database. In our research, we define the change rationale as the information that provides justification of the change decision. Social psychologists have investigated the kinds of information in communication that influences people's attitudes (Barnard, Mason, & Ceynar, 1993; Petty & Wegener, 1998). These studies showed that the shared information that is plausible and logical and adds

new to the issue is more likely to cause attitude change (Petty & Cacioppo, 1984; Leippe & Elkin, 1987). Fabrigar, Priester, Petty, and Wegener (1998) have found when people had higher access to different attitudes, the message's argument quality had a greater impact on persuasion. We believe that presenting not only the change decisions but also their rationales can benefit project managers when deciding the current situation. Xiao and Carroll's (2013) study indicates that individuals' reasoning skills are affected by sharing task rationale explicitly in group activities. By archiving and sharing the change rationales across the organization's projects, it is expected that the project managers will improve their reasoning skills on making decisions in the long term. The improved reasoning skills can positively affect the quality of change decisions since decisions are made after better reasoning processes.

3.2   Interface Design

ProjectTales interface is divided into two separate components arranged vertically on the screen: the history overview component and the project detailed view component. Each component of the system then provides some coordinated views of different dimensions of the underlying dataset, supporting project managers in yielding deeper insight of the history data (Wang Baldonado, Woodruff, & Kuchinsky, 2000). Figure 1 shows a screenshot of the system

3.2.1   History Overview Component

The history overview component consists of three different views, namely the history grid, the cause bar, and the rationale bar. The history grid is designed to provide a visual overview of the changes made in different attributes of different projects. In this view, each row represents a project in the database and each column represents an attribute of the project. Since colour is a pre-attentive visual feature and can be separately decoded from the spatial position by the human visual system (Ware, 2004), colour coding is used to represent the number of changes in different attributes of projects. When there has been no change, the cell is coloured with a light gray. In case of a change, the number of changes is encoded using the luminance channel of the red color; thus, cells with high change frequency appear darker and the ones with low change frequency are shown brighter.

The history grid is further enriched with an interaction mechanism, allowing project managers to sort the projects according to the number of changes in a specific attribute by clicking on the attribute label. Similarly, clicking on a project label causes the attribute list to be sorted according to the number of changes for that project. Such a visual representation allows project managers to quickly gain an overview of the change frequency across different projects and different attributes, and to further explore this information for projects and attributes of interest using the sort feature.

In addition to the history grid, the history overview component offers two vertical histograms to visually depict an overview of the causes and rationales for the changes. The cause bar represents a sorted view of the causes from the most frequent one to the least, whereas the rationale bar shows the most frequent words used in the change rationales. Since stop words are of no value when exploring the prominent words in rationales, they are eliminated from the rationale bar. The history grid is highly linked with the cause and the rationale bar via linking and brushing technique. Hovering the cursor over each cell in the history grid highlights the corresponding causes and rationales in both histograms. In addition, if project managers hover the cursor over a cause or a rationale, the corresponding cells in the history grid get highlighted.

3.2.2   Project Detailed View Component

When exploring the change history overview, project managers may be interested to focus on a particular project in detail. Double clicking on a project label loads the project detailed view component with two linked views of the status line chart and the project table. In the status line chart, the x-axis represents the duration of the project as a timeline. This axis is augmented with red glyphs, each representing a change

that has happened to the project in the specific time. Presenting changes on a timeline may allow project managers to investigate the sequence of changes and see how a particular change has triggered the following changes. The y-axis of the chart represent the status of the project, allowing project managers to assess the effects of a particular change or a series of changes on the project status.

Finally, the project table provides project managers with the detailed information of changes, including the changed attribute, time of the change, old and new values, causes of the change, and the full rationale, in a textual format. These two views are also linked with linking and brushing techniques as hovering the mouse cursor over a glyph in the chart or a row in the table, causes the corresponding representation of change to get highlighted in the other view. These two views allow project manager to identify a potentially interesting change in one view and then detect the same change in the other view to perform further exploration.
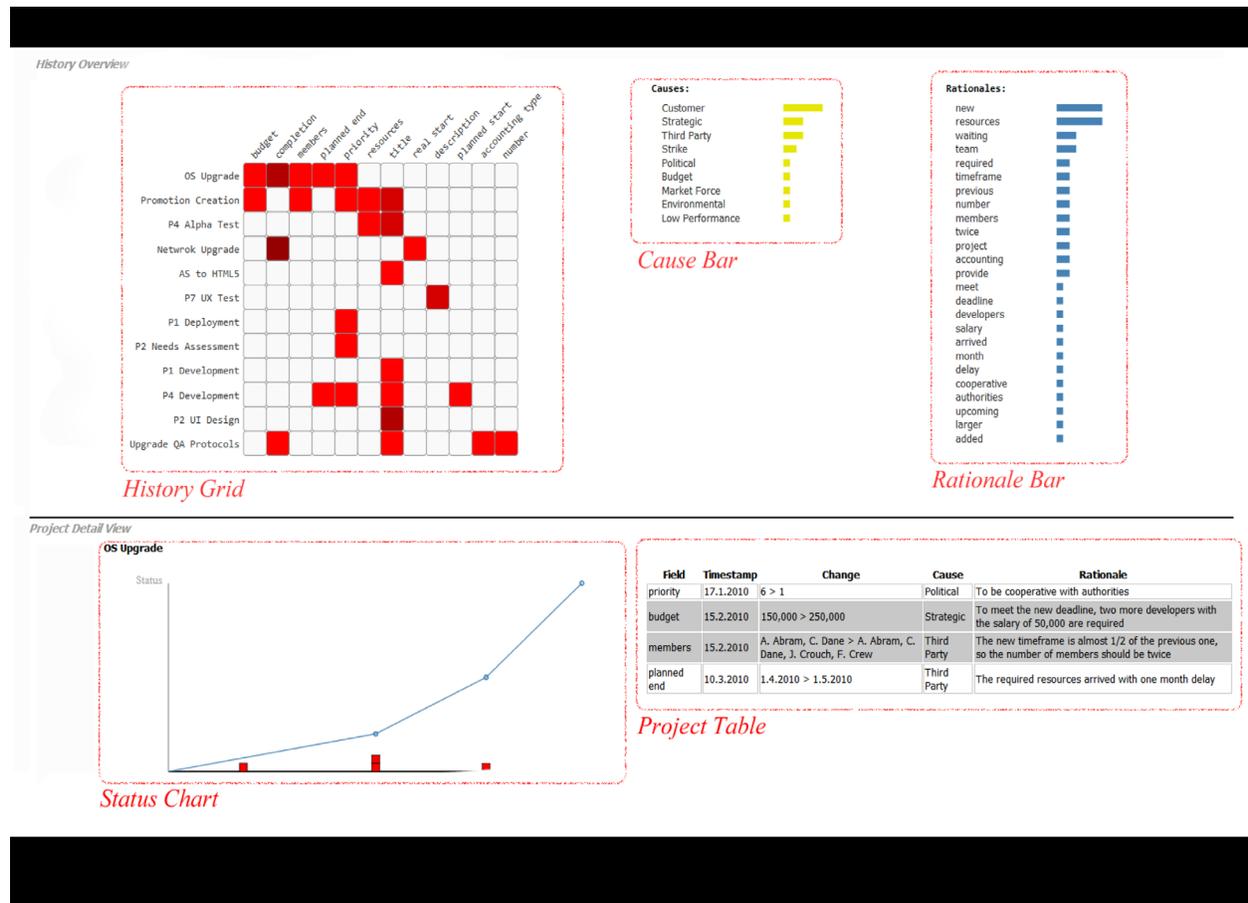

Figure 1: A screenshot of ProjectTales

4   Evaluation

We are currently conducting an evaluation study of the prototype in a controlled laboratory setting. This study is designed as a within-subject study, in which participants are asked to perform a different decision-making task with each interface (ProjectTales and a table-based baseline system). The two tasks are designed to have the same complexity level and they consist of three subtasks about retrieving and interpreting information about changes and change rationales. We have been recruiting projects managers to use ProjectTales and compare it with the baseline system.

5   Conclusion

Change management "is an integral process related to all project internal and external factors, influencing project changes; to possible change forecast; to identification of already occurred changes; to planning preventive impacts; to coordination of changes across the entire project" (Voropajev, 1998). In this poster paper, we presented a software prototype with the main purpose of facilitating project managers to make more efficient and effective decisions when deciding a possible change. With our current design, ProjectTales provides project managers with the ability to browse, explore, and gain an insight into the history of causes, decisions, and rationales of the previous changes through interactive visualization techniques. Our underlying design rationale is that archiving the change causes and rationales are as important as the change decisions themselves for future reuse. We are currently conducting an evaluation study to examine the usability and our rationales of the design.

6   References

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