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Facilitating experience reuse among software project managers

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Abstract

Organizations have lost billions of dollars due to poor software project implementations. In an effort to enable software project managers to repeat prior successes and avoid previous mistakes, this research seeks to improve the reuse of a specific type of knowledge among software project managers, experiences in the form of narratives. To meet this goal, we identify a set of design principles for facilitating experience reuse based on the knowledge management literature. Guided by these principles we develop a model called Experience Exchange for facilitating the reuse of experiences in the form of narratives. We also provide a proof-of-concept instantiation of a critical component of the Experience Exchange model, the Experience Exchange Library. We evaluate the Experience Exchange model theoretically and empirically. We conduct a theoretical evaluation by ensuring that our model complies with the design principles identified from the literature. We also perform an experiment, using the developed instantiation of the Experience Exchange Library, to evaluate if technology can serve as a medium for transferring experiences across software projects.

Keywords: Software project management; Knowledge reuse; Experiences; Narratives; Design science research

1. Introduction

Software project management is a complex process and unfortunately is not always considered synonymous with the word "successful." Software development project snafus have made worldwide headlines, and organizations have lost billions of dollars due to poor project implementations [34]. The Standish Group reported that only 29% of the over 9000 software development projects evaluated in the 2004 report were successfully developed on time, on budget, and with the desired functionality. Approximately half of the software development projects in their report were classified as challenged, meaning these projects experienced cost and budget overruns or lacked functionality. The remaining 18% of projects were cancelled or the resulting software was never used [53]. While these numbers are dismal, the statistics in this report are generally better

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than those from ten years ago; for example, in 1994 the success rate of projects was only 16% [26]. The state of software project management is improving, but organizations have a continued need to reduce, or preferably, eliminate unnecessary spending on software projects.

Project managers often rely on their experience to make decisions to keep the project on schedule and meet the budget, functionality, and quality targets. An experienced project manager is one of the keys to project success [52]. Organizations understand the importance of experience and often hire individuals based on experience rather than academic training [11]. Experience is important because when individuals receive new information, the information is processed in light of one's past experience to develop and create new knowledge [11]. For creating knowledge, experience is critical [37] because it connects the past to the present [11]. Experience may be deeply personal or can be communicated through storytelling [13], mentoring [56], and documentation [46]. Yet, often, software project managers fail to share their experiences with others, thus preventing this type of knowledge to be reused [48].

The Standish Group found that 97% of *successful* projects were managed by an experienced project manager [52]. Not all organizations, however, have the luxury of assigning experienced project managers to their software projects. Organizations may promote individuals to the position of software project manager because of their ability to write code or lead a small team of developers; however, technical skills and programming experience alone is not enough to guarantee success as a software project manager [52]. There are additional competencies, such as process, team, customer, business, personal, and uncertainty management, needed in software project management beyond those gained as a programmer that are necessary to be successful as a software project manager [6,8,45].

1.1. Research problem

Project management textbooks and courses often focus on hard skills, which are "the technical skills required within the confines of a domain" [54, p. 693]. Software project management processes, tools, techniques, and methodologies are necessary hard skills for a project manager [6,54]. Researchers have even developed tools to assist project managers with specific hard skills. One example is the development of a tool to determine the efficient scheduling and allocation of resources on a project based on skill level and salary [2]. Assigning resources efficiently based on resource cost and skill level is an example of a hard skill that a project manager must learn; however, understanding how the resources assigned to tasks work together in terms of team compatibility, trust, and creativity is a soft skill that software project managers should develop as well.

The additional soft skills, related to communication, organizational culture, leadership, problem solving and decision making, team building, flexibility and creativity, and trustworthiness [6] are necessary throughout a software project [54] but it is the acquisition and mastery of soft skills that are thought to improve the likelihood of success of a software project [54]. Developing and applying both hard skills and soft skills can provide clarity and vision to a software project manager that must specify a course of action [8]. Soft skills can be learned on-the-job, via role playing, or through courses [33]; however, on-the-job learning can be a costly training ground for new software project managers to learn these soft skills. By facilitating software project managers in sharing their past experiences from software projects, other project managers have the ability to reuse this knowledge related to soft skills. Sharing experiences could help those with less experience to avoid mistakes and repeat successes on their projects. This research, therefore, addresses this issue by developing a design theory and, based on the design theory, a model to facilitate knowledge reuse among software project managers, specifically focusing on experiences.

1.2. Research approach

There are different research approaches that can be used to examine the research problem. One approach would be to use explanation research [62] to examine the current problems and best practices associated with knowledge reuse among software project managers. While this would be helpful in understanding *why* knowledge reuse is difficult and may provide prescriptive advice regarding how individuals should use knowledge management systems, this would not fully address the research problem. Our goal is to do more than simply