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INTRODUCTION

The conventional heavyweight, document-driven software development method requires extensive planning, codified processes, and rigorous reuse (Boehm, 2002). This method works best when developers know all of the requirements in advance, and when requirements are relatively stable (Hickey and David, 2005; Schach, 2004). The conventional method is still largely used in industry due to its straightforward, methodical, and structured nature (Fruhling and De Vreede, 2006). However, this method has a number of key shortcomings that have been widely reported, including the inability to effectively handle changing requirements, and the tendency to significantly be over budget and behind schedule (Sommerville, 2004; Watson, 2004; Schach, 2004; Boehm, 2002). To address some of the conventional method shortcomings, agile methods were proposed such as Scrum, eXtreme Programming (XP) and Crystal (Beck, 2000; Highsmith, and Cockburn, 2001). Many research papers reported agile methods’ potential benefits such as greater customer satisfaction, faster adaptation to changing circumstances, lower defect rates, and faster development time (Augustine et al., 2005; Boehm and Turner, 2005; Little et al., 2004; Parrish et al., 2004).

Among several agile methods, a team-based light weight software development method named Scrum is claimed to be suitable for large-scale project (Schwaber and Beedle, 2002). However, very little research has been done on whether the Scrum method is viable when it is utilized for large-scale and complex projects. Further, the majority of research on the agile methods was conducted in environments where all of the developers were in the same geographic location. However, many software companies deal with large-scale projects with developers scattered in different geographic location. For example, two global companies, Hewlett Packard and Intel Corporation, have been using the agile methods among their scattered branches for about three years (Holmstrom et al., 2006). Many global companies are getting involved in more distributed software development environments due to the influence of globalization of information technology and information systems development. Also, the potential of delivering high-quality software in a timely and economical manner (Batra et al. 2006; Gopal et al. 2002) attracts many global organizations to involve in distributed virtual team environment. As interest in distributed software development using the agile methods is growing in the software industry, it is be very important to study various issues and challenges arising in managing virtual teams that are scattered in geographically, culturally, and temporally different locations.

As a first step, an in-depth case study will help to understand the viability of the distributed Scrum method, and how distributed Scrum can be utilized in managing virtual teams. Therefore, an exploratory research will be conducted at a company that uses the Scrum method for large-scale and complex projects with developers in two different geographical locations.
Purpose of the Study
The main focus of the study is to find the solutions for management issues of virtual software development teams in different geographical locations as the agile methods applied to large-scale and complex projects. In addition, we would like to find the viability of the Scrum method in the distributed software development milieu. The following research questions will be probed through the study.
1. What are the best practices to manage virtual teams using distributed Scrum?
2. What technologies are appropriate to mitigate the well-known issues including communication, control, and coordination (Ghosh, et al., 2004; Holmstrom et al., 2006; Ramesh, et al., 2006) among virtual teams?
3. Which aspects of Scrum should be successfully adopted for large-scale projects in distributed environment?
4. What are the key factors of distributed Scrum to improve the quality of large-scale projects in terms of bug rates, development time, and cost?

Research Plan and Research Method
A case study will be conducted at a company founded in 1978. This company has been developing and maintaining software for more than 500 clients across 36 states in the USA. In particular, this company specializes in mission-critical and sophisticated public safety software, such as jail management system, fire/emergency medical service (EMS) management system, computer-aided E911 dispatch system, mobile communications system, and records management systems (RMS).

The company has a total of 30 software developers and QA personnel, which are divided into five development teams in the software division. After more than twenty years of conventional software development methods usage (e.g. waterfall), the company switched to the Scrum software development method in April, 2005 and has been actively engaged in all aspects of the Scrum method. About four months after the company decided to use the Scrum method, the main part of the company moved to a different city. Since then, the company has kept two work places and software development teams have been divided between the two locations.

Three types of data will be gathered to triangulate findings and enhance trustworthiness (Glesne, 2006). Both quantitative and qualitative data will be collected. The quantitative data will include two-year accumulated bug rates, development time, and development costs that were stored in the company’s database. The bug rates will be examined not only to see if there is any significant change after implementation of the distributed Scrum, but also to check if there are any patterns or trends among bug rates. The development time and development costs will also be measured in terms of work progress per month. The qualitative data will contain answers from open-ended surveys and interview questions as well as field notes from an observation. The surveys and face-to-face individual interviews will be conducted among software developers, QA (Quality Assurance) personnel, and product managers.

Expected Contributions of the Study
We expect that the research results will provide valuable insights into decision makings at operational, managerial, and strategic level. For operational decision making, our findings will give guidelines to organizations that are already using the Scrum method in distributed team environment by providing the best practices to manage the virtual teams to deliver high-quality software product in a timely and economical manner. For managerial decision making, our findings will help organizations make decisions on whether it is cost effective and productive to outsource their projects to geographically separated virtual teams. For strategic decision making, the findings will help organizations that use a traditional software development method make decisions on adopting the distributed Scrum method as a future development tool. Overall, we believe knowing how to manage virtual Scrum team could lead to significant improvements in software industry.
References


