Analysis of Software Requirements Engineering Exercises in a Global Virtual Team Setup

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ABSTRACT

Businesses that are involved in offshore software development often operate in a virtual project environment in which peer teams located at customer premise exchange project specifications with the offshore software development facility. To understand the complex issues in such a virtual project environment during the requirements definition phase of the software development cycle, we conducted an exploratory research study, involving 24 virtual teams based in Canada and India, working on defining business requirements for software projects, over a period of five weeks. The study indicates that trust between the teams and well-defined task structure positively influence the efficiency, effectiveness, and satisfaction level of global virtual teams.

Keywords: globalization of IS; requirements specification; software development; virtual teams

INTRODUCTION

Software globalization has resulted in (1) software development activities spreading to emerging and developing nations and (2) software development moving away from the traditional co-located form to a form in which global virtual teams collaborate across national borders (Carmel, 1999). Large telecommunications and software companies have numerous software development groups residing in different countries around the world. The different groups work in a virtual setting, with members of the software development teams, interacting and communicating their work.

Apart from the low-cost advantage of developing software in India and China, organizations use geographically distributed software development groups in a “follow the sun” approach to enable almost 24-hour software development cycle (Carmel, 1999). Leveraging global resources for software development has almost become a norm in companies, such as Motorola, which has over 25-software development centers around the world (Battin et al., 2001). Organizations also outsource their
software development activities to contractors outside their home countries (Heeks et al., 2001). For example, India has a dominant offshore software development industry, which accounts for more than $9 billion in software export. This industry has more than 2,800 software export firms and employs approximately 600,000 software professionals (NASSCOM, 2004).

These global software development projects use Global Virtual Teams (GVTs), which are primarily linked through computer and telecommunications technologies across national boundaries. GVTs rarely meet in a face-to-face context and thus face numerous problems not associated with traditional teams. Dube and Pare (2001) outline several of the problems and challenges faced by GVTs. They indicate that cultural diversity of the global teams distributed across many countries while providing potential richness to the team constitution also presents an enormous challenge for GVTs. Communication and language barriers and discrepancies in technological proficiency among team participants are also factors that influence the effectiveness of GVTs. To equip and to train the students of software engineering to handle the challenges of working in GVTs, faculty in many schools have set up distributed software engineering laboratories and conducted virtual team exercises in their courses. These exercises help students better understand the distributed collaborative software development process (Favela & Pena-Mora, 2001). It was also our endeavor to provide a simulated global virtual team environment to potential business managers and software developers to enable them to better understand the software industry’s globalization. In this research work, we present the findings from conducting such a global virtual team project exercise between student teams from the University of Western Ontario, Canada (UWO) and the Indian Institute of Management, Lucknow, India (IIML).

SOFTWARE REQUIREMENTS ENGINEERING AND GLOBAL VIRTUAL TEAMS

A software engineering project involves a number of different activities, such as requirements specifications, analysis, design, coding, testing, and implementation. The requirements definition phase of the software development life cycle is often cited as the most critical of the phases (Maciaszek, 2001). This is due to the fact that mistakes made during the requirements analysis phase cascade into the latter phases of the software development life cycle, including functional specifications, code development, and implementation. Previous research has shown that mistakes made during the requirements phase can cost as much as one hundred times that of coding errors (Sommerville & Kotonya, 1998). Thus, it is critical to have an exceedingly well-defined requirements document in order to ensure a successful project that meets the three concurrent metrics of on time, within budget, and in conformance to requirements.

Modern approaches to the requirement definition stage emphasize cross-functional teams, group collaboration, and consensus decision-making techniques (Gorton & Motwani, 1996). In the requirements definition phase of the software development life cycle, co-located teams comprised of users, business analysts, and system analysts work closely to define the requirements definition artifacts. Gorton and Motwani (1996) argue that if virtual teams are used in the requirements definition stage, the teams can exploit the overnight gain
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