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Effect of a virtual project team environment on communication-related project risk

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Abstract

Over 150 Information Technology practitioners participated in a study of differences in communication risk between traditional project teams and those that operate virtually, with some team members physically remote. Contrary to prior research, results indicate the level of risk from inadequate communication is not significantly greater when team members are not grouped in one location. Further, despite increased dependence of virtual teams on technology for communication, there was no evidence of significantly more project risk due to technological failure. However, virtual team projects exhibited notably more risk due to insufficient knowledge transfer. A plausible explanation is decreased implicit or informal knowledge transfer in virtual environments. We conclude that the possibility of insufficient knowledge transfer should be included in virtual project risk management plans, and consideration should be given in such projects to the extent to which knowledge that is traditionally shared implicitly might be shared explicitly through electronic means.

Keywords: Virtual teams; Virtual projects; Risk management; Project management; Communication; Co-located teams; Knowledge transfer; Implicit knowledge

1. Introduction

This research addresses an area where little prior research has been done, communication-related risk on virtual team projects. Virtual project teams have been defined as groups of people who are not co-located, using electronic communication to work together to accomplish a goal (Jones et al., 2005). Team members can be located in different cities, states and increasingly in different countries. An example of a virtual project team, as described by a study participant, was a team that resided in both the United States and India working on a project to create a customized website integrated with an ERP system.

Project teams composed of members from different countries are becoming common place (Klie, 2007). This increase is due to the global nature of business, outsourcing, off shoring, availability of high-bandwidth communications, and reduced business travel due to cost and security concerns (Aspray et al., 2006). Foreign competition for talent has played a role in the global nature of virtual teams also. This current prevalence of virtual teams raises questions about differences that may exist between virtual software project teams and traditional co-located software project teams. One such area of potential difference is the degree of impact caused by various project risk factors, and in particular, communication-related risk factors.

Managing risks on projects is important to project success and often falls under the domain of the project manager, as indicated by Olsson (2007), who states that risk management has become "an integral part of project management". DeMarco and Lister (2003) describe the close relationship between risk and problems, "risk is a problem

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that has yet to occur, and a problem is a risk that has already materialized" (DeMarco and Lister, 2003). This relationship between a risk and a problem suggests a link between project risk and project failure. Unmitigated risks that escalate into problems can result in effects ranging from unmet user requirements and performance issues to loss of dollars and lost opportunities, not to mention complete project failure (Boehm, 1991; Wallace and Keil, 2004).

The negative impact of software project risk has been measured for years by the Standish Group. Their CHAOS survey and report has shown overall from 1996 to 2006 the percentage of challenged and cancelled projects has decreased slightly, by between 3% and 13% while the percentage of successful projects overall increased by 1% to as much as 6% (Standish Group, 1999, 2001, 2004, 2006). These numbers support perceptions of the continuing existence of project problems and failures, whose general prevention is the goal of project management.

Identification and knowledge of project risk factors has been cited as a method of decreasing the severity and the impact of risk (Boehm, 1991). Consequently, multiple researchers in project management created lists of top project risks on software projects (Boehm, 1991; Barki et al., 1993; Keil, 1998; Wallace and Keil, 2004). One of the original lists was created by Boehm (1991) and consisted of the "top ten software risk items": personnel shortfalls, unrealistic schedules and budgets, developing the wrong functions and properties, developing the wrong user interface, gold-plating, continuing stream of requirements changes, shortfalls in externally furnished components, shortfalls in externally performed tasks, real-time performance shortfalls, and straining computer-science capabilities. By and large, these prior project risk studies were conducted at a time when projects involved traditional, co-located teams. By comparison, little is known about risks on virtual projects.

This paper investigates the risk management aspects of project management by exploring the differences on virtual versus co-located software project teams for some specific communication-related risks, an area of risk identified by Wallace (1999). We report here on the communication risk portion of a larger research study. The main purpose of this manuscript is to address the following research question: What, if any, are the significant differences in communication-related risk between virtual and co-located Information Technology projects?

Three specific project risk factors relating to communication were distilled from past research, along with a combination of focus groups and pilot studies. Note that the focus group and pilot studies are described later in the methodology section.

2. Communication-related risk factors

It is not uncommon to find communication issues on projects. Lee-Kelley and Sankey (2008) indicated in their research that time zone and cultural differences affected communications as well as team relations on projects (Lee-Kelley and Sankey, 2008). During the face-to-face interview portion of this research study, a project manager commented on the difficulty in communicating with remote resources, "It is more difficult to communicate over the phone than to walk over to the person's desk to talk." This same project manager indicated problems occurred when team members resided on different LANs, making it difficult to exchange documents. Overall these communications issues cited by the interviewee were overcome by creating extra steps in the process which then "translated into loss of time." Focus group participants in the study also elaborated on communication issues they encountered on their projects. Some of their comments are as follows:

- Particularly in large projects, communication is essential for efficient coordination.
- Lack of communication can lead to people "not being on the same page" and "working at cross purposes".
- Lack of communication can lead to confusion that can add more cost and more time.
- Having good communication with your client and group members is very important when working on any project.
- False starts from misunderstandings are expensive in terms of time and resources and they also create bad feeling within a team.
- Meeting overload is also a risk; projects that meet too much and work too little also suffer from poor morale.

Information collected through the literature review, from face-to-face interviews and the focus group was distilled into three communication-related risk factors that were included in the survey. Each of these three risk factors is described next.

2.1. Lack of or inadequate communication

The first communication-related risk factor that emerged from this study is *Lack of or inadequate communication*. This risk factor is defined by a low level of communication frequency with project team members or communication at the wrong level of detail for the audience. For example, a project dealing with familiar processes and well known work might require a low level of communication frequency since team members are experienced. On the other hand, innovative or technically challenging projects might need a high level of communication frequency to deal with many unknowns. Effective communication has been identified as the most critical component of teamwork (Jones et al., 2005). Wallace and Keil (2004) in their research on outsourced projects, which sometimes can be classified as a type of virtual project, indicated team risk may be due to greater challenges in team communication and coordination, especially when at least two organizations were involved (Wallace and Keil, 2004). Examples of communication at the wrong level of detail for the audience include upper