

Maritta Pirhonen

Supporting the Success of an Information Systems Project

Viewpoints on Education and Replacement of the Project Manager



JYVÄSKYLÄ STUDIES IN COMPUTING 172

Maritta Pirhonen

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Editors

Seppo Puuronen

Department of Computer Science and Information Systems, University of Jyväskylä

Pekka Olsbo, Ville Korhonen

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ABSTRACT

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Finnish summary

Diss.

Information systems (IS) have enormous economic influence to organizations' performance. The studies of IS project success or failure suggest that many projects still fail. The objective of this dissertation is to discover how IS projects can be supported to attain success. The research area is studied from the viewpoints of education and replacement of the project management. First, academic project management education as a means to provide students with skills and competence needed in successful project management is studied. Then, the reasons for replacement of the project manager (RPM) during an IS project and its effects on project success are examined. Finally, suitable theories for studying the RPM phenomenon are explored. Both qualitative and quantitative research methods are employed. The findings show that academic project management education using the project based learning model by utilizing real-world tasks enables students to practice the soft skills and competences needed in project management. In addition, the results indicate that there are a number of reasons that cause RPM: a project manager's personal life situation becomes inconsistent with the project, inadequate competence of the project manager, the client demands a replacement or the project manager is needed in another project inside the organization. RPM affects project management success, the project's schedule and cost, communications, team spirit and personal chemistry. Finally, the results suggest that Alter's Work System Theory, Engeström's Activity Theory (AT) and Gregor's theories seem to be suitable for studying the phenomena. This study offers recommendations for designing academic project management studies. In addition, contradictions that explain RPM emphasize the importance of handling the RPM situation in a controlled way.

Keywords: academic education, information systems, project-based learning, project management, project manager, project success, replacement, skills

Author's address Maritta Pirhonen
Dept. of Computer Science and Information Systems
University of Jyväskylä
40014 Jyväskylän yliopisto
maritta.r.pirhonen@jyu.fi

Supervisors Tero Vartiainen
Dept. of Information Processing Science
University of Oulu

Seppo Puuronen
Dept. of Computer Science and Information Systems
University of Jyväskylä

Airi Salminen
Dept. of Computer Science and Information Systems
University of Jyväskylä

Reviewers Helen Hasan
School of Economics
Faculty of Commerce
University of Wollongong
Australia

Kari Kuutti
Dept. of Information Processing Science
University of Oulu

Opponent Erkki Sutinen
Department of Computer Science
University of Eastern Finland

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1 INTRODUCTION

Project success is critical in information systems (IS), and it has enormous economic influence to organizations' performance. The studies of project success or failure suggest that many IS projects still fail (Keil and Mähring 2010). Many of them are cancelled before completion, many run over budget and over time, and many that are completed are not able to satisfy customers' needs. Standish Group Report from the year 2009 estimated that 44% of IS projects were criticized for their late, over budget and inadequate results (Standish Group 2009). Project success is multidimensional, and it can be compartmentalized on the basis of different perspectives, such as project management, product, or learning success.

There are number of human issue factors that influence IS project success, e.g., competence, skills and experience of project managers and project staff, low staff turnover, top management support, stakeholders' involvement, quality of project management and leadership (Gottschalk and Karlsen 2005, Czurchy and Yasin 2003, Thite 1999, Chua 2009, Kloppenborg and Petrick 1999). Many of these factors are crucial on successful projects. A major contributor, for example to cost overruns, is inadequate project management (Cusing 2002). Though changes in management and personnel turnover during the project present challenges for IS projects (Dey, Kinch and Ogunlana 2007, Keil, Cule, Lyytinen and Schmidt 1998, Sauer, Gemino and Reich 2007), there has been relatively little attention given to how changes in project management, e.g., replacement of the project manager, are related to project success and failure. Project managers play an important role in managing a project. The responsibility for keeping the project within the budget, schedule, and appropriate scope rests with the project leader (Cadle and Yeates 2001, Blackburn 2002, Day and Bobeva 2003, Cleland 1984, Kezsbom, Schilling and Edward 1989). In order to ensure project success, the traditional role of project managers in controlling time, cost, and quality can be supplemented by their role as the team motivator. According to Whittaker (1999), successful project management is dependent on the project managers' competence. The lack of required skills or expertise can contribute to serious budget and schedule

overruns. Personal competencies of project managers, apart from project management tools and techniques, appear to be more relevant for their workplace performance (Crawford 2005).

The connection of the project manager's skills to project success has been addressed in several studies (Hyväri 2006, Iacovou and Dexter 2004, Müller and Turner 2007). Often these skills are learnt in working life because they cannot be learned by studying them in a book or in a lecture hall. Therefore, project management education needs to focus on practice of managing rather than on tools and techniques of management. Universities educate potential IS project managers so that they can better deal with the complexities related to their roles. The growing need for qualified IS project managers poses challenges to universities and higher education institutions. They are required to design efficient educational models that provide a working life environment already during the studies. Project-based learning (PBL) offers a model that enables students to practice the skills and competences needed in working life projects by utilizing real-world work assignments in time-limited projects (Tynjälä, Pirhonen, Vartiainen and Helle 2009). Learning soft skills required in IS project management and leadership during the project studies might support IS project success in "real world" working scenarios, too.

Replacing the project manager (RPM) during a project is critical incident that affects the success of the project. Somehow surprisingly and regardless of the occurrences of this phenomenon, review of the project management literatures reveals that no research on this subject is being conducted in the field of IS (the results of the systematic literature review are reported in Article 8). To reduce the risk of project failure when a project manager is replaced, the replacement process should be paid attention to in an initiation phase of a project. The disadvantages of the RPM can be minimized by proper planning and by putting preventive measures in place.

The objective of this dissertation is to discover how IS projects can be supported to attain success. The research area is studied from the viewpoints of education and replacement of the project management. Academic project management education is studied in order to learn how it can support IS project success. Skills and competencies of project managers have influence on project success. If competency is improved, then the likelihood of project success is also improved. Then, a critical incident in IS projects, replacement of the project manager (RPM) during an IS project is studied. The aim is to gain understanding on how projects can succeed in situations where the project manager is replaced during the project.

The thesis is organized as follows. Background and related literature are provided in Chapter 2. Brief description of activity theory and academic project management education are presented in Chapter 3. Research design can be found in Chapter 4. A summary of the included papers is given in Chapter 5. Results are discussed in Chapter 6. The conclusion, limitations, and directions for future research are given in Chapter 7.

2 BACKGROUND AND RELATED LITERATURE

This chapter provides the overview and central concepts of information system project, project management, project success, and managerial turnover.

2.1 Information system project and project management

A project is a typical work form in the field of information systems and can be defined as a group of people and other resources that are temporarily together to accomplish a specific objective to be completed within certain specifications, defined schedule, and a budget (Liu and Horowitz 1989, Schwalbe 2010). In addition, Schwalbe (2010), Kwak and Stoddard (2004) emphasize that projects are always unique and often customized, which can cause uncertainty in their planning and implementation.

In the field of information systems, different authors and researchers use different terms for projects. Murch (2001) uses the term “IT (information technology) project”, whereas Schwalbe (2010) uses the term “information technology project” or “software development project”. Schmidt, Lyytinen, Keil and Cule (2001) employ the concept “IS (information systems) project”. Several articles (e.g., Boehm and Ross 1989, Keil et al. 1998, Wallace and Keil 2004) and also Cotterell and Hughes (1995) focus on the term “software project”. Dekkers and Forselius’ (2007) article discusses “ICT (information and communication technology) projects”. In this dissertation, the concept *information system project (IS project)* refers to all the above-mentioned connotations.

Information system projects are disrupted by a variety of changes, including technology, project requirements, as well as personnel and the external environment. IS projects are different from other projects, as they can be very diverse. In contrast to projects in many other industries, IS projects are characterized by high complexity, conformity, changeability, invisibility, and high chances of failure (Jurison 1999, Schwalbe 2010, Rodriguez-Repiso, Setchi and Salmeron, 2007). In a construction project (e.g., building a house), it is

relatively easy to separate the processes of building a roof and that of altering a floor plan, but in IS projects the elements affect each other and existing information systems (Dekkers and Forselius 2007). The main characteristics of IS projects can be summarized in seven categories (Peffer, Gengler and Tuunanen, 2003):

- abstract constraints
- difficulty of visualization
- excessive perception of flexibility
- hidden complexity
- uncertainty
- tendency to software failure, and
- goal to change existing business processes.

Many IS projects are cancelled before completion, many run over budget and over time, and many that are completed are not able to satisfy customers' needs (Standish Group 2009, Cerpa and Verner 2009, Glass 2006). IS projects support every possible industry and business function, therefore managing projects requires not only skills in information technology but also understanding of customers' area of business (Schwalbe 2010). Managing complex IS projects is a difficult task because of constantly changing conditions, technology, resources, project requirements, and schedules (Murch 2001, Meredith and Mantel 2006). Project lifecycle is a collection of project phases; a typical project goes through the phases of initiation, planning, execution, and closing (Rakos, Dhanraj, Fleck, Harris, Jackson and Kennedy 2005). The result of an IS project is difficult to visualize in the initiation phase of the project, therefore IS project management can be seen as the process of making visible what is invisible.

The goal of project management is to use the resources available effectively to accomplish a set goal with a certain criteria and within a schedule and budget, utilizing the existing resources efficiently (Liu and Horowitz 1989). The main tasks of project management include defining the requirements, establishing the extent of work, allocating the resources required, planning the execution of the work, monitoring the progress, and adjusting deviations from the plan (Munns and Bjeirmi, 1996). Munns and Bjeirmi (1996) define project management as "the process of controlling achievement of the project objectives". According to Project Management Institute (PMI 2008, 37), project management is "the application of knowledge, skills, tools, and techniques to project activities to meet project requirements", and it consists of nine knowledge areas: integration management, scope management, time management, cost management, quality management, human resource management, project communications management, project risk management, and project procurement management. Furthermore, one significant part of project management is to manage project knowledge so that learning between individuals and between projects is managed (see e.g., Reich 2007, Reich, Gemino and Sauer 2008, Karlsen and Gottschalk 2004, White and Fortune 2002).

In this dissertation, *project management* is a process the goal of which is to successfully manage a project within a schedule, budget, requirements and knowledge.

2.2 Project success dimensions

A major concern in the field of project management and a recurring theme in the literature is that of project success. It is multidimensional, very context-dependent and changes with time. Project success (or project failure) is measured differently by different stakeholders, as they have varying and unique interests in the project (e.g., Nasir and Sahibuddin 2011, Shenhar, Driv, Levy and Maltz 2001, Larson and Gobeli 1989, Nelson 2005, Pinto and Pinto 1991, Agarwal and Rathod 2006, Aladwani 2002a, Standing, Guilfoyle, Lin and Love 2004). Therefore, it is possible to claim that "...project success is an object of study that is inclusive, ambiguous, and multidimensional" (Ika 2009, 13).

Given the complexity involved in measuring project success, several studies have identified different critical success factors, but there is a lack of consensus as to how to judge project success and the factors and influence of that success (Wateridge 1995, Thomas and Fernández 2008, Besner and Hobbs 2006, Yeo 2002). In spite of the success as measured by the so-called golden triangle (a project completed within time, budget and requirements), a project is a failure if the project outcome cannot serve its purpose during its life-span or enhance the client's business. A project might be delivered late and run over its budget, yet it might lead to an increase in the capability of the organization to better manage future projects (Kerzner 2008). In the development projects, the most important success factor is the result and its quality (cf. health care systems in hospitals), whereas, for example in mobile phone industry, completing the project in time is crucial because in a business of that kind "time-to-market" is a competitive advance. Thus, a fundamental problem of IS project assessment is the varied and sometimes contradictory stakeholders' expectations and their perceptions of success or failure. The stakeholders, e.g., contractors, sponsors, project managers, team members, business process owners, users, information technology developers, business managers, etc., may perceive project success differently (Shenhar and Levy 1997, Shenhar et al. 2001). A project which is considered to be a success by the project manager and the team might be considered a failure by the client because both of these parties are evaluating project success differently. Therefore, defining success is a key step in understanding the important 'success factors', the factors contributing to the project success. According to Cooke-Davies (2002), they are the inputs to the project management system that have influence on the outcome.

Traditional approach to measuring project success, the so-called triple constraint measures of time, cost and quality objectives has been found much too strict because it limits the view of project management to that of providing tactical value and not strategic value, as it does not include the necessary links

to the project's outcome (Jugdev and Müller 2005). For that reason, several authors distinguish between project management success (focuses on the project's process, activities, and resources) and product success (effects of the project's final product (meeting the project owner's strategic organizational objectives, and satisfaction of users' and stakeholders' needs where they relate to the product) (Atkinson 1999, de Wit 1988, Dvir, Raz and Shenhar 2003, Baccarini 1999, Collins and Baccarini 2004, Cooke-Davies 2002, Munns and Bjeirmi 1996, Turner 1999, Wateridge 1998, Westerveld 2003, Seddon, Staples, Patnayakuni and Bowtell 1999). The product of IS project is an information system, the success of which can be seen in a number of ways. DeLone and McLean (2003) present their well-known six major categories of measures of IS success. These are system quality, information quality, use, user satisfaction, individual impact and organizational impact.

In addition to project management success and product success, several studies have observed the impact of the context on factors that are considered most critical and certain success factors that are related to success. For example, human factors have been included among the significant project success factors (e.g., Pinto and Slevin 1988, Jugdev and Müller 2005, Kirsch 2000, Belassi and Tukel 1996, Belout and Gauvreau 2004). Moreover, project structure (Belassi and Tukel 1996), organization size (Hyväri 2006), project type (Shenhar et al. 2001), project size (Belassi and Tukel 1996, Hyväri 2006, Aladwani 2002b) and project manager experience (Hyväri 2006, Müller and Turner 2007, Iacovou and Dexter 2004) all affect the relative importance of project success.

Kerzner (2008) brings a new dimension to project management success, stating that company success depends on a continuous stream of successfully managed projects not on a success of a single project. Therefore, the main purpose of the project management is not the delivery of a successful project but to be more successful for more of the time. The success of projects depends heavily on the right combination of knowledge and experiences, therefore dissemination and usage of existing knowledge is critical. Knowledge from project processes, context, and rationale needs to be captured in a way that enables new project members to familiarize themselves quickly with the project history. The need to learn from one project to the next is clearly of vital importance, but is often neglected (Newell, Bresnen, Edelman, Scarbrough and Swan 2006, Williams 2008).

This refers to project knowledge management critical to project success, especially in the case of the employee turnover during the project. According to Karlsen and Gottschalk (2004), total project success includes project knowledge management. The results of their study show that project success relates to the extent of the culture of effective knowledge transfer. An effective means of learning from experience that combines explicit knowledge with tacit knowledge is to encourage people to learn and to embed that learning into continuous improvement of their work (Cooke-Davies 2002). Taking account of past experience has been seen an important success factor also in the study of White and Fortune (2002). Some certain knowledge and useful experiences are

often lost after a project is completed or when the team members move on to other activities. Retaining knowledge and lessons learned from previous IS projects is important not only from the viewpoint of projects but also from that of learning organizations (Reich 2007, Schindler and Eppler 2003).

Baccarini (1999) states that project success is affected by time. For project management success, the judgment of whether a project has successfully met the objectives of time, cost and quality is a short-term assessment made during or immediately after closing the project. Product success, on the other hand, is a long-term measure. Judgment on this can only be passed once the project's product has been utilized, and this can be many years after the project's completion. Shenhar et al. (2001) held similar views on time perspective on project success. They identified four major distinct success dimensions: (1) project efficiency (meeting schedule and budget goals), (2) impact on the customer (meeting functional performance and technical specifications, fulfilling customer needs, solving customer's problems, actual use of the product by the customer, and customer satisfaction), (3) direct business and organizational success (commercial success, creating a large market share), and (4) preparation for the future (creating a new market, a new product line, and developing a new technology).

Table 1 summarizes the dimensions of project success used in this study. We suggest that project success consists of three distinct but interconnected components: project management success, product success, and learning success. Each component has its own timescale for measurement: short-term (during or at completion of the project) or long-term (years after the project completion).

TABLE 1 Dimensions of project success

Success Dimension	Assessment criteria	Time perspective
Management	Time, cost, quality	Short term
Product	Meeting the strategic organizational objectives Satisfaction of users and stakeholders needs Business and direct success Financial rewards	Long term
Learning	Knowledge management during a project Continuous stream of successfully managed projects Extent of culture of effective knowledge transfer	Short/Long term

Management success is seen as a short-term success which can be measured during or at completion of the project. Product success is a long-term dimension and is measurable when project's product has been utilized in the organization. Learning success can be seen both as short-term and long-term success: it is measurable at completion of the project or later on.

Although project management success and project product success are inseparable linked, the causal relationship between them is weak: project management success as such does not guarantee a long term success of the

project. For example, in spite of project management failure the resulting product can be a success (Baccarini 1999). Even though long-term success can be seen as more important than project management success because it has longer lasting effects (Baccarini 1999, Munns and Bjeirmi 1996, Shenhar and Levy 1997), many project managers consider meeting time and budget criteria more important than meeting other long-term criteria such as delivering a quality system to users (Wateridge 1998). This as such is not surprising because the project manager's job ends at completion of the project. However, learning success should be understood as an essential part of the project success. Learning from experiences (Cooper, Lyneis and Bryant 2002, Engwall 2003) and encountered problems during the project helps the organization in developing learning culture and in carrying out successful projects by employing better project practices.

2.3 Project manager's role on project success

A project manager is accountable and responsible for what occurs in a project. His prime task is managing a project to success (Cadle and Yeates 2001, Nicholas 2001, Blackburn 2002, Day and Bobeva 2003, Cleland 1984, Kezsbom et al. 1989). The responsibility for keeping the project within its budget, schedule, and appropriate scope rests with the project manager. Turner and Müller (2003) compare a project manager to "a chief executive" of a temporary organization. Regarding the role of the project manager, Verner, Overmyer and MacCain (1999) found that the capability of project managers plays an important role in project performance, and, according to Nicholas (1994, 172), the role is so central that 'without it there would not even be project management - the project manager being the glue holding the project together and the mover and shaker spurring it on'. This role can be supplemented by his/her role as a motivator of the team in order to ensure project success. Motivation is one of the important tasks in leadership and a significant factor contributing to the success of IS projects.

Many authors in the field of project management have become increasingly interested in the competency of project managers (Kerzner 2008, Crawford 2005, Lee, Trauth and Farwell 1995, Lee and Lee 2006, Muzio, Fisher, Thomas and Peters 2007). Some have related project management competence to project management effectiveness (Crawford 2005, Schmidt et al. 2001) and project success (Jiang, Klein and Balloun 1996). According to several studies, IS projects fail not because of a lack of technical know-how or technology itself but because of insufficient management and planning and inadequate implementation of these plans (Hartman and Ashrafi 2002, Keil et al. 1998, McConnell 1997, El-Sabaa 2001, Henderson and Lee 1992, Lee-Kelley and Loong 2003).

For managing a project to success, a project manager needs both managerial and leadership skills and competence. Moreover, many business-

related facets of running a project are needed: expertise in the areas of organization, communication, finance, and human resources (Baccarini, Salm and Love 2004, Hornik, Houn-Gee, Klein and Jiang 2003, Henderson 2008, Boddy 2002, Maylor 2003, McFarlan 1981, Guinan, Coopriider and Faraj 1998) as well as risks (Wallace and Keil 2004, Wallace, Keil and Rai 2004, de Bakker, Boonstra and Wortmann 2010, 2011), quality and leadership issues (Smith 1999, Kirsch 2000, Gottschalk and Karlssen 2005, Czurchy and Yasin 2003, Turner and Müller 2005, Müller and Turner 2010, Geoghegan and Dulewicz 2008, Zimmerer and Yasin 1998). In addition, successful management of IS projects requires systematic ways to manage project knowledge (Kasvi, Vartiainen and Hailikari 2003, Weiser and Morrison 1998, Mathiassen, Petter, Vaishnavi 2007, Disterer 2002, Reich et al. 2008), this being a challenge especially in case of replacing the project manager during a project (Pirhonen and Vartiainen 2007).

The competence of the project manager, who needs to have both managerial and leadership skills, is in itself a factor in successful management of projects. Managerial skills are often described as “hard skills” and include processes, tools and techniques applied to a project. The relationship of the project manager’s competencies and leadership skills to project performance has been addressed in several studies (Brill, Bishop and Walker 2006, Gottschalk and Karlssen 2005, Czurchy and Yasin 2003, Turner and Müller 2005, Anantatmula 2010, El-Sabaa 2001, Sotiriou and Wittmer 2001, Zimmerer and Yasin 1998, Yang, Huang and Wu 2011, Faraj and Sambamurthy 2006, Bloom 1996, Jurison 1999, El-Sabaa 2001, Gillard 2005, Thite 1999). Effective leadership is needed to keep the team focused and motivated throughout the project (Nicholson, Sarker, Sarker and Valacich 2007). The role and the characteristics, competencies and leadership skills of the project manager and the knowledge and experience of the project team are crucial factors contributing to project success.

2.4 Management turnover

Changes in management and personnel turnover during a project present challenges for IS projects, and loss of key personnel like the loss of the project manager during the course of a project may cause tremendous negative impacts on project productivity (Lyytinen and Hirschheim 1987, Dey, Kinch and Ogunlana 2007, Keil et al. 1998, Sauer, Gemino and Reich 2007). Replacing the project manager during an IS project is not uncommon. Surprisingly, a systematic literature review from databases ACM, IEEE, Wiley, ABI EBSCOHOST, Elsevier Emerald and Springer Link in 2012 reveals that no research on this subject is conducted in the field of IS. Two studies (Abdel-Hamid 1992, Parker and Skitmore 2005) have touched on the issue but not in the working life contexts. The study of Abdel-Hamid (1992) explored the issue in the context of a role-playing project simulation game. The subjects of the study were graduate students at a U.S. business school, studying computer

systems management. The results of the study show that managerial turnover can lead to a considerable shift in costs or to schedule trade-off choices, affecting staff allocations and eventually project performance in terms of both cost and duration. Parker and Skitmore (2005) collected data by internet from a group of project managers employed in each of the major business units of an international aerospace company. The result of their study shows that turnover disrupts and negatively affects the performance of the project team, the project, and conceivably negates the competitive advantage of the organizations concerned.

Staff turnover in general has been a topic of considerable research in areas such as sociology, organizational behavior, finance, economics, and accounting, as well as in the field of IT, but only a rather small number of researchers have addressed the topic of management turnover - variously termed replacement, displacement, succession, dismissal or changes. Research in economics and finance typically is limited to the CEO and firm performance measures (Murphy and Zimmerman 1993, Coughlan and Schmidt 1985, Leker and Salomo 2000, Shen and Cannella 2002, Puffer and Weintrop 1991, Ton and Huckman 2008, Lausten 2002). Much of this research indicates that organizational performance is an important factor in top management turnover. CEOs are generally held responsible for a firm's performance and are likely to be replaced once a firm has started performing poorly.

The causes of turnover of IT professionals have been studied since the 1980s at least (Dittrich, Couger and Zawacki 1985, Baroudi 1985, Guimaraes and Igbaria 1992, Igbaria and Greenhaus 1992, Igbaria and Siegel 1992, Igbaria and Guimaraes 1999, Moore 2000, Dinger, Thatcher, Stepina and Craig 2012, Thatcher, Stepina and Boyle 2002, Jiang and Klein 2002, McKnigh, Phillips and Hardgrave 2009). With respect to turnover in IT, the management study of Longenecker and Scazzero (2003) shows that the most obvious and significant problem caused by turnover is its negative impact on achieving performance goals. In addition, turnover causes communication breakdowns, a loss of focus and direction, and an increase in unresolved problems. Yet, staff turnover in organizations has its advantages and disadvantages. The disadvantages can be minimized by proper planning, and by putting preventive measures in place. Turnover may in some circumstances have positive effects, which include economic, sociological, psychological and social psychological effects (Dalton and Todor 1982), and sometimes it has been used as a means to gain better results.

2.5 Summary

Project success is multidimensional, context-dependent and measured differently by different stakeholders. For the reason that information systems (IS) have an enormous economic impact to organization's performance, it is important to recognize the factors contributing to project success. Project

management success is highly dependent on the project manager, and one of the factors contributing to project success is the competence of the project manager. Project success has been studied from a short-term and from a long-term perspective. In this study, success dimensions are compartmentalized on the basis of management, product, and learning success. Management success is seen as a short-term success which can be measured during or at completion of a project. Product success is a long-term dimension and is measurable years after the completion of the project. Learning success can be seen both as a short-term and long-term success. Research on staff turnover has been a topic of considerable research in areas such as sociology, organizational behavior, finance, economics, and accounting, as well as in the field of IT, but only a rather small number of researchers have addressed the topic of project management replacement.

3 ACTIVITY THEORY AND PROJECT MANAGEMENT EDUCATION

This chapter provides an overview and describes the central concepts of activity theory, project-based learning and the Project Management course. In this chapter, activity theory is used as a lense to examine project environment both in working life and in the project management course. Activity theory (AT) offers a wide theoretical framework to study both individual and collective activity. It provides an analytical framework within which to study human activity.

3.1 A brief overview of activity theory

The history of activity theory (AT) has three main origins. The first of these is in the classical German philosophy of Kant and Hegel, in which the concept of activity was first introduced. Marx and Engels further elaborated on the concept of activity. The third source is the Russian cultural-historical psychology founded by Vygotsky (1978) and Leont'ev (1978). Leont'ev's conception of activity has been further developed by Engeström (1987, 1999) into a theoretical tool which allows one to examine an activity system and determine inconsistencies, frictions, conflict, and points of tension. He added the rules, community, and division of labor to the basic triangle of subject-object-tool.

AT focuses on the interaction of human activity and consciousness within its relevant environmental context and has been used in different fields of research (Iivari and Lyytinen 1998, Rogers 2008). The traditional main application areas are learning and teaching, including workplace learning (Engeström, Miettinen and Punamäki 1999, Roschelle 1998, Koschmann 1998, Murphy and Rodrigues-Manzanares 2008, Engeström and Sannino 2010, Blackler 1993, Blackler, Crump and McDonald 1999, Helle 2000, Karasavvidis 2009, Collis and Margaryan 2004, Jonassen and Rohner-Murphy 1999). AT as a

framework for human-computer interaction research and design, computer-supported cooperative work, information systems development, and product design has been widely used (Bødker 1989, 1991, 1996, Engeström 2008, Kuutti 1991, Kaptelinin 1996, Nardi 1996, Vrazalic and Gould 2001, Spinuzzi 1999, Tuikka 2002, Bertelsen and Bødker 2000, Diaper and Lindgaard 2008). Korpela, Mursu and Soriyan (2002) used AT in information systems development, but it seems that it has not been used in the research on IS project management. However, concepts from AT provide a promising analytical framework for trying to understand the phenomenon of project manager replacement.

One reason why AT has gained popularity within different disciplines is the flexibility of its basic concepts and the flexibility of the level on which activity can be observed. AT lets us to study the fundamental dialectical relations between the development of an individual and his/her society (Bødker 1997). According to AT, it is not possible to define activity, action etc., because the definition would totally rely on what the subject, object etc. is in any particular situation.

The main unit of analysis of the activity theory is a human activity in a specific social setting. Activity system is an “object oriented, collective, and culturally mediated human activity” (Engeström and Miettinen 1999, 19). An activity is a collective phenomenon; it has a subject (an individual or collective) who understands its motive. Activity is undertaken by the subject using instrument (tool) to achieve an object, thus transforming objects into outcomes. The concept of tool in activity theory is broad and embraces both technical tools, which are intended to manipulate physical objects (e.g., a hammer), and psychological tools, which are used by human beings to influence other people or themselves (e.g., the multiplication table or a calendar). Activity is always associated with long-term purposes and strong motives. A model of the structure of AS includes the interacting components of subject, object, tools (instruments or artifacts), division of labor, community, rules, and outcome. The relations between and within the constituents (often also referred to as components, elements or nodes) of an activity are mediated by various artifacts (e.g., instruments, signs, procedures, machines, methods, laws, forms of work organization, ideas, pen, paper) that have been created and transformed by actors during the development of the activity itself and carry with them a particular culture – a historical residue of that development. The three processes of mediation are presented as transforming the nature of the contexts within which people act. All the members of the community share the object (and the motive) of the activity (see Figure 1).

Instruments mediate between a *subject* and the *object* of doing, which is transformed into an outcome. The object is seen and manipulated not as such but within the limitations set by the instrument (or tools, as defined in the previous paragraph). *Rules* mediate the relationship between community and subject, while *division of labor* mediates the relationship between *community* and *object*. Rules cover both implicit and explicit norms, conventions and social relations within a community in their relation to the transformation process of

the object into an outcome. The responsibilities of the members of the community are coordinated by some division of labor (e.g., the division of tasks and roles among members of the community and the divisions of power and status), yet guided by rules. These rules regulate as well as constrain actions and relationships in the activity system (Engeström 1990, Engeström 1993, Kuutti 1996).

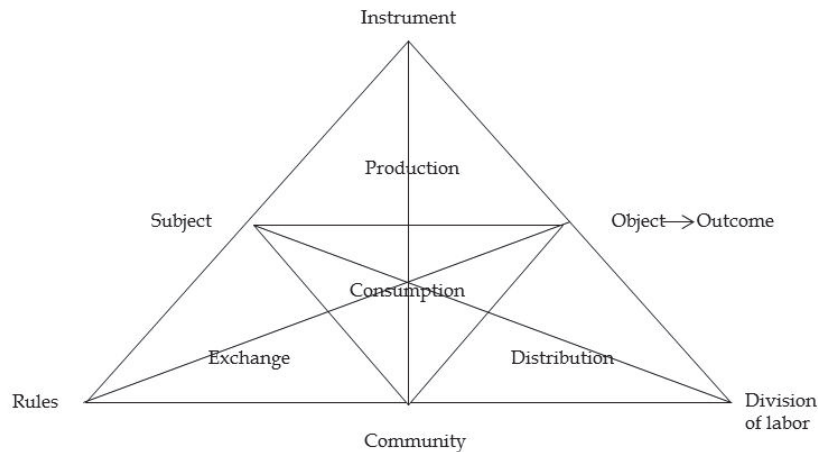


FIGURE 1 The structure of human activity (Engeström 1987, 78)

Instruments mediate between a *subject* and the *object* of doing, which is transformed into an outcome. The object is seen and manipulated not as such but within the limitations set by the instrument (or tools, as defined in the previous paragraph). *Rules* mediate the relationship between community and subject, while *division of labor* mediates the relationship between *community* and *object*. Rules cover both implicit and explicit norms, conventions and social relations within a community in their relation to the transformation process of the object into an outcome. The responsibilities of the members of the community are coordinated by some division of labor (e.g., the division of tasks and roles among members of the community and the divisions of power and status), yet guided by rules. These rules regulate as well as constrain actions and relationships in the activity system (Engeström 1990, Engeström 1993, Kuutti 1996). Thus, activity has a double nature, with both an external and an internal side. The subject and object of an activity are in a reciprocal relationship. The subject transforms the object (Engeström 1991). Conversely, the properties of the object penetrate into the subject and transform him or her.

An activity is made up of one or more actions the completion of which satisfies the initial object (motive). An activity and all the component actions are always realized in specific contexts, which determine to a large extent the conditions under which the actions can be realized and the initial motive satisfied (e.g., availability of tools). Activities can be considered as having three hierarchical levels: activity, action and operation (Kuutti 1996). Actions are conscious and goal-directed and must be undertaken to satisfy the object. They

are implemented through automatic operations which do not have their own goal. An operation is like a non-conscious event within an action. Different actions may be undertaken to meet the same goal. Similarly, operations may contribute to a variety of actions. All the operations are actions at the beginning, but when the action has been practiced long enough it will become an operation. The borderline between an action and activity is fuzzy, and movements to both directions are possible. (Engeström 1987, Kuutti 1991)

TABLE 2 Leontiev's three-level model (Engeström et al. 1990, 140)

Unit	Directing factor	Subject
Activity	Object/motive	Collective
Action	Goal	Individual or group
Operation	Conditions	Non-conscious

Kuutti (1991) provides an example of the activity-action operation concerning the activity of completing a software project, in which 'programming a module' or 'arranging a meeting' are at the action level and 'using operating systems commands' or 'selecting appropriate programming language constructs' are at the operation level.

According to Engeström (1987), the systemic model illustrated in Figure 1 is the simplest possible. The systemic whole is still the most important entity, but it is linked with 'neighbor' activities (see Figure 2). These include, first of all, the activities where the objects and outcomes are embedded (object-activities). Secondly, they contain activities that produce instruments and tools for the central-activity (instrument-producing activities). Furthermore, there are activities like education and schooling of the subjects (subject-producing activity). In addition, they contain e.g., management and legislation activities (rule-producing activities). (Engeström 1987, 88).

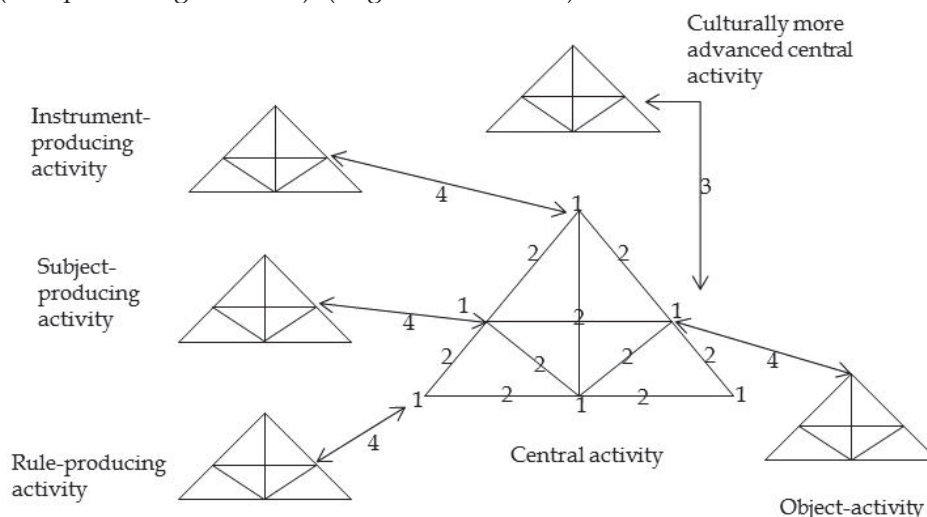


FIGURE 2 The central activity and its neighbour activities (Engeström 1987, 89)

Each component of an activity is the outcome of other activities which produced it. As an example of instrument-producing activity, there could be an activity that produces a project management system that supports the project manager in his work by producing e.g., project track reports, Gantt charts etc. Project management education is one example of subject-producing activity. Its outcome is to enable students to develop skills needed in real-life project management (central activity).

Contradictions constitute a key principle in AT and are characteristic of activity systems. Kuutti (1996, 34) describes contradictions as “a misfit within elements, between them, between different activities, or between different development phases of a single activity”. The numbers below (1-4) refer to four levels of contradictions (see Figure 2):

Level 1: Primary inner contraction (double nature) *within* each constituent component of the central activity.

Level 2: Secondary contradiction *between* the constituents of the central activity.

Level 3: Tertiary contradictions *between* the object/motive of a culturally more advanced form of the central activity.

Level 4: Quaternary contradictions *between* the central activity and its neighbor activities.

Contradictions are developmentally significant and exist in the form of resistance to achieving goals of the intended activity and as emerging dilemmas, disturbances, and discoordinations. They are “historically accumulating structural tensions within and between activity systems” (Engeström 2001, 137). Contradictions are important because they can result in change and development (Engeström 2001). They generate “disturbances and conflicts, but also innovative attempts to change the activity” (p. 134). In activity systems, “equilibrium is an exception and tensions, disturbances, and local innovations are the engine of change” (Cole and Engeström 1993, 8). In spite of the potential of the development of contradictions in an activity system, these contradictions do not always lead to a transformation because they may not be easily recognized or acknowledged, visible, or even openly discussed by those experiencing them (Cole et al. 1993, Engeström 2001). On the other hand, contradictions that are not discussed may be embarrassing, uncomfortable or culturally difficult to confront and include personal habits, bad behavior or incompetent leadership.

To summarize, activities are carried out by subjects, motivated by an object, transforming an object into an outcome. An object may be shared by a community of people working together to achieve a desired outcome. Tools, rules and division of labor mediate the relationship between subjects, community and object. Contradictions within and between activity systems work as the driving forces in learning and development.

3.2 Project-based learning

As stated in Section 2.3, the connection of the project manager's skills and competencies to project success has been addressed. For managing a project successfully, both managerial and leadership skills – often referred to as soft, generic, human or people skills – are needed. Contrary to hard skills learning, these skills cannot be learned by studying them in a book or a lecture hall; one learns them by practice. Moreover, there is a growing need in IT industries all over the world for high-level IS professionals such as project managers. Therefore, an important challenge for educational institutions is to develop pedagogical practices that allow students to participate in working life projects and to confront real-life problems.

Problem-Based Learning (PBL – nowadays also the abbreviation for Project-Based Learning) has become widely recognized over the last 40 years (Graaff and Kolmos 2003). It has been proven to be a successful educational approach in many different study domains. Project-Based learning model refers to the theory and practice of utilizing real-world work assignments in time-limited projects to achieve mandated performance objectives and to facilitate individual and collective learning (Smith and Dods 1997).

The theory of PBL is based on constructivism. According to the constructivism theory, the learner is guided to build and modify his or her existing mental models, i.e., the focus is on knowledge construction rather than on knowledge transmission as in the theory of behaviorism. Constructivism takes account of the situational nature of learning and thus advocates authentic or simulated environments (von Glasersfeld 1984). There are five significant features of PBL (Helle, Tynjälä, Lonka and Olkinuora 2007):

- a problem or a question serves to drive learning objectives;
- a concrete artifact is constructed;
- the learners control the learning process (pacing, sequencing, and actual content);
- the learning is contextualized (what we learn in a particular context we recall in similar contexts); and
- projects are complex enough to induce students to generate questions of their own.

In many models of project-based learning, students work on real world projects. This creates good conditions to learn a vast range of skills in various project areas. In project work, the project manager and the members of team have to learn to co-operate effectively for identifying how to reach the project goal. Students learn management, teamwork, and communications, as it involves both individual and co-operative activities, interactive discussions and writing in the form of plans, reports, memos etc. This kind of learning offers a very concrete and holistic experience of certain processes such as the process of

construction work or managing a project (Helle, Tynjälä and Olkinuora 2006). The PBL approach has been adopted for years in engineering education in Aalborg University (Graaff and Kolmos 2003). The results of the study by Kjersdam (1994) show that students graduated from Aalborg are more productive compared to graduate students from other educational institutions. This difference stabilizes within two years.

3.3 Project management course as a subject-producing activity

The project-based learning (PBL) approach has been adopted for a long time in information system education at the department of Computer Science and Information Systems at the University of Jyväskylä (see more Pirhonen 2009, 2010). The implementation of the Project Management Course (PMC) is based on PBL approaches (Tynjälä, Pirhonen, Vartiainen and Helle 2009). The learning goal of the course is to provide a comprehensive and realistic view of information systems experts' work in both project management and implementation of tasks.

The learning environment is maintained in co-ordination with three parties – the student group, the university, and the client organization. A written cooperation contract between the three parties is drawn up before the project starts. PMC in the terms of activity theory is presented in Figure 3.

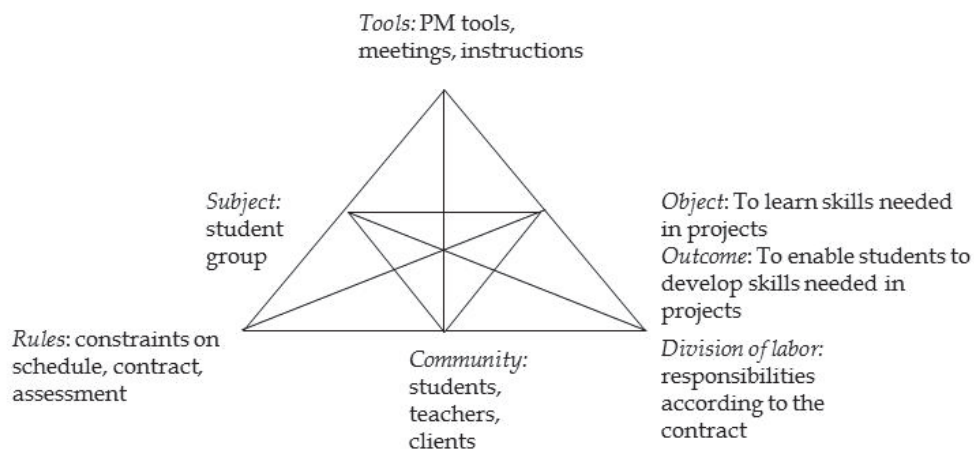


FIGURE 3 Project management course as an activity

The objectives of the cooperation parties differ. From the students' and the university's point of view, learning of "real project work" is the main goal, whereas the clients' main motive to co-operate with the university may be to find potential employees for recruiting. They want to be satisfied that each new recruit can add value immediately. In order to add value, students must possess

the necessary technical skills as well as “real world” work experience and generic skills. During the six-month PMC course, clients’ representatives have a great chance of finding out about the students’ skills and competences suitable for their organization. Certainly, their secondary objective is to generate results for the project, this being also the students’ objective. These different objectives might cause contradictions between the parties. In such an event, the teachers need to intervene in the situation by discussing with the parties.

Replacement of Project Manager during Project Management Course

Information system projects are disrupted by a variety of changes, including changes in technology, project requirements, personnel and the external environment. Thus, replacement of the project manager (RPM) in on-going projects is not unusual in IS projects. The replacement may occur, for example to rescue a troubled project, because of a sick-leave, or the replacement may have been planned in advance. In PMC, the replacement is planned in the beginning of the project. Each student is expected to take the role of the project manager, a role that rotates every month. This gives them experience to handle changes in project management during their project manager period. Successful management of IS projects demands systematic ways to manage project knowledge, and this poses a challenge especially in case of replacing the project manager in an on-going project. RPM may cause communication breakdowns, a loss of focus and direction and an increase in unresolved problems if not managed in a controlled way. One of the aims of RPM is to handle the change in a way that it does not cause a communication breakdown with the client. Thus, clients must be notified of RPM. The instructions draw attention to knowledge transfer from the predecessor project manager to the successor project manager. At the end of the management period, project managers are expected to evaluate what they have learnt from their period of acting as a project manager. As part of this evaluation process, project managers keep a log, documenting experiences and reflections during the project management period. They should recognize the vital knowledge that must be transferred to the successor manager and write down their learning experience as well as list the subjects suitable for development. In addition, they should reflect upon their activities and report the issues they would do in a different way and on how to do them. The report is used as a guide by the successor manager. This procedure enables process continuity and learning from the experiences of predecessor managers.

Post-project assessment is an important part of the project management life cycle. As a part of this assessment process, the team prepares a performance assessment and an analysis report during a closing phase of a project. The students are challenged to think critically about their experience, link their observations with the learning goals, discuss problems they have faced during the project and explain how they resolved problems and how they can apply what they have learnt to future projects. The experiences about RPM are reported as well. These post-project assessment activities prove to be useful in

that they encourage student to reflect, thereby increasing the quality of learning outcomes. The reports are used for the courses of the following years, enabling new students to familiarize themselves with the environments of previous projects. Thus they need not to “re-invent the wheel”.

IS project in terms of activity theory

Project as an activity is described in Figure 4. In the depiction of IS project as an activity system, the project manager and the team are chosen to be subjects. A subject plays a key role when analyzing other elements of an activity; in this case, we are interested in the project manager’s and the team’s perspectives when analyzing IS project activity.

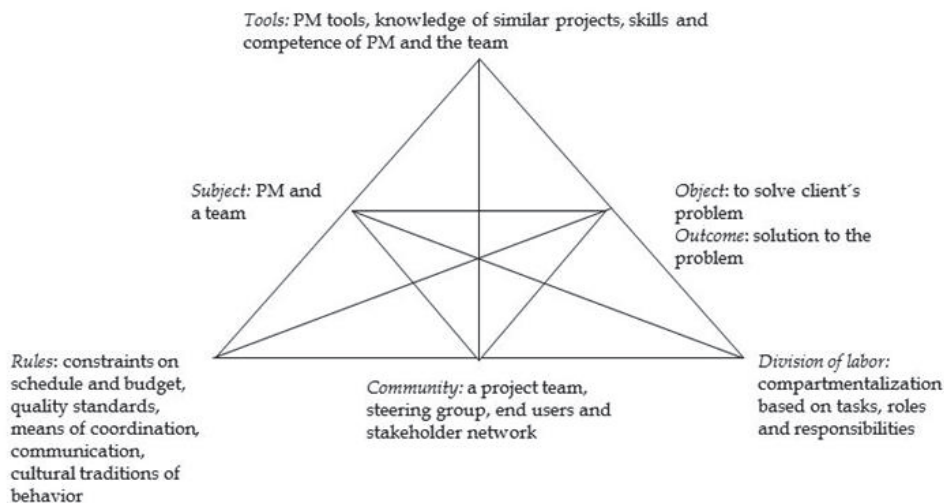


FIGURE 4 Information system project as an activity

The object of an IS project is to find a solution to the client’s problem by producing an information system (solution to the problem). The long-term aim of an information system project from the client’s point of view is to benefit from the result, either by the firm’s increased performance or business and better financial rewards. The tools include a project management system (e.g., software, standards), reports of experiences, learning from earlier projects and the skills and competences of the subjects.

Any changes in the project environment (e.g., replacement of the project manager or change of technology) affect the project activity system and function as a trigger for an expansive learning process. An essential component of expansive learning is shared knowledge, which accumulates in the explicit form of rules and tools and in the tacit form of cultural, historical, social and experience-based knowledge. This knowledge is a vital element in a project’s long-term success.

Activity theory emphasizes that a tool comes fully into being when it is used and that knowing how to use it is a crucial part of the tool. So, the use of

tools entails an evolutionary accumulation and transmission of social knowledge, which influences not only the external behavior but also the mental functioning of individuals.

Therefore, if subjects do not apply their learning from earlier projects or if they are incompetent, it may influence the quality of outcome. Thus, the skills and competences of subjects are a vital part of successful projects. Rules are included in the project plan and cultural behavior in projects.

In terms of activity theory, PMC can be depicted as a subject-producing activity (see Figure 5):

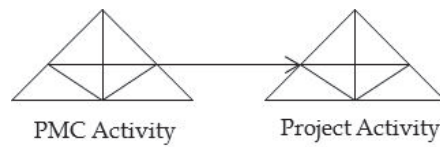


FIGURE 5 Project activity and its neighbor activity

Its outcome (see Figure 3) is the subject of the project activity. As said in Section 2.3 the competence of the project manager is in itself a factor in successful management of projects. Thus quality of PMC activity outcome produced by the academic project management education (see Figure 3) is vital because it affects the project success.

4 RESEARCH OBJECTIVES AND METODOLOGY

This chapter outlines the research objectives, questions, and research methods. In addition, the relation between the original articles, their contribution to the main research problems, and research framework are explained. Data collection and analysis methods are described. Finally, the validity of the research is evaluated.

4.1 Research objectives and research questions

The focus of this dissertation is on information systems (IS) project and project success. The objective of the study is to discover how IS projects can be supported to attain success. First, academic project management education is studied in order to learn how it can support IS project success. Then, a critical incident in IS projects, replacement of the project manager (RPM) during an IS project is studied. The aim is to gain understanding on how projects can succeed in situations where the project manager is replaced during the project. Finally, in order to find theories about how RPM should be further studied to attain success in IS projects, the applicability of the terms of Activity Theory (Engeström 1987) and Work System Theory (Alter 1999, 2002) for project management and Gregor's (2006) division of theories are investigated.

The following research questions are presented:

RQ1: How project management success in IS projects can be supported by academic project management education?

In order to investigate the issue more closely, the research question is divided into two research sub-questions:

RQ1-1: What are the vital skills and competences of a project manager contributing to project management success?

RQ1-2: How do the learning outcomes of project-based studies correspond to the needs of successful project management?

Replacing the project manager is common in software firms (Aiyer, Rajkumar, and Havelka (2005). The idea to study the phenomena emerged from the experiences in the project management course (see the description of the course in Section 3.3). During the course, the role of the project manager rotates every month so that each member of the project group takes the role of the project manager once during the course. In order to explore why project manager replacement takes place and how it affects to project success in real life IS projects, the following research question is defined:

RQ2: What are the reasons for replacing the project manager during a project and its effects on IS project management success?

A review of project management literature reveals that no research on replacing the project manager is conducted in the field of IS (see Chapter 1, p. 10). In order to find theories for studying RPM further, we defined the following research question:

RQ3: What theories seem to be suitable for studying the RPM phenomenon in a more detailed level?

4.2 Research methods

The research methods of this study include both qualitative and quantitative methods. The research approach used in Articles 5, 6 and 8 can be located within the interpretive (Walsham 2006) and hermeneutic (Shotter 1983, Klein and Myers 1999) traditions, where social realities are assumed to be constructed. To come to sound conclusions requires studying the interpretations of the research subjects. These interpretations are available in texts which are analyzed. Therefore, hermeneutics is a suitable method, as it is based on studying interpretation of texts (Kvale 1983), and the main purpose of hermeneutics is to analyze the parts and the whole. Shotter (1983) defines hermeneutics as follows:

[Hermeneutics is]...the theory of human understanding in its interpretative aspect. In particular, a hermeneutic is a set of practices or recommendations for revealing an intelligible meaning in an otherwise unclear text or text-analogue (Shotter, 1983, p. 268).

Hermeneutics was selected because the objective of the studies was to gain better understanding of the factors involved in project manager replacement.

Case study would have also been a suitable method to explore the issue, but it proved to be impossible to find suitable projects for research cases. Interviews were carried out to gather data for the RPM study. The sampling procedure used for interviewees was the so-called snowball sampling method (Bieranacki and Waldorf 1981, Noy 2008). According to that process, the researcher accesses informants (interviewees) through contact information that is provided by other informants. This process is repetitive: the informants refer the researcher to other informants; the researcher contacts them and is then referred to yet other informants, and so on.

The quantitative method used in Article 3 was selected to investigate the students' perceptions about the learning outcomes of the Project Management Course (PMC) designed around PBL principles. Quantitative method is widely used among social science researchers, as it allows the measurement of theoretically conceived constructs such as opinions, emotions and experiences that may not be directly observable otherwise.

4.3 Validity of the research

The quality of any empirical research can be determined against the following validity measures: construct validity, internal validity, external validity and reliability (Yin 2004, 40). Validity is "the degree to which the finding is interpreted in a correct way" (Kirk and Miller 1986, 20). Krippendorff (1980) defined the validity criteria for content analysis as follows: internal validity - or reliability - means that the research procedure yields the same results regardless of the circumstances of application. For instance, if the research method is reliable, duplication of the data analyzed by another researcher will produce the same results. In order to ensure the validity of the analysis and findings in Articles 5, 6 and 8, the interview transcripts were carefully read through by the authors. After reading, the first author produced the first version of the categorization of the perceptions. Then the second author asked critical questions, constantly referring back to the data and comparing the data with the emerging construct classes and categories. During the discussion, process categorization was redefined and the disagreements were resolved consensually. As agreement on the final version was reached, the results are believed to be valid. This is a common verification method used in qualitative research when research results are inductively derived from data (Strauss and Corbin, 1990).

External validity assesses whether the findings represent, as claimed, a real phenomena in the context of the data. Krippendorff's (1980) external validity resembles, in some respects, the validity criterion for interpretive studies proposed by Lacity and Janson (1994, 149). They see validity in interpretive research in terms of its acceptance by the scientific community. In other words, if fellow scholars find the research meaningful, the results can be considered valid and worthwhile. As Klein and Myers (1999, 74) state: "...the participants, just as much as the researcher, can be seen as interpreters and analysts", and

accordingly, in this study, the interviewees were asked to produce interpretations of the phenomenon of RPM. The strength of the interviewing method is that it focuses directly on the study topic (Yin 1994). On the other hand, its weaknesses include the risk of bias due to poorly constructed questions, response bias, inaccuracies due to poor recall, and reflexivity, which means that the interviewee says what the interviewer wants to hear (Yin 1994). According to Fielding (1993), with interviewing as a research method, the problems include interviewees' attempts at rationalization and possible fear of being exposed. Furthermore, as far as reliability is concerned, researchers with different backgrounds and of different personality types conducting interviews may generate a response bias.

A standard 'stopping rule' for qualitative research with respect to the sample size was used to verify the sufficiency of the sample size. In terms of numbers, 12 interviewees (in Articles 5 and 6) represent a small population, but, with the point of redundancy at the 10th interview, it can be argued that, with these 12 subjects, we did elicit a preliminary list of the phenomenon of replacement of the project manager. In Article 8, our results are confirmed by 49 informants.

4.4 Relationships of the included articles

This dissertation contains eight articles focusing on the research objectives from different viewpoints. The correspondence of the included articles to the research questions is summarized in Table 3.

TABLE 3 The included articles and the research questions

	RQ1	RQ1-1	RQ1-2	RQ2	RQ3
Article 1	x	x	x		
Article 2	x				
Article 3	x		x		
Article 4					x
Article 5				x	
Article 6				x	
Article 7					x
Article 8				x	x

There are three main issues under focus in this study: academic project management education that provides the student skills needed in successful project management, replacement of the project manager (RPM) during a project and suitable theories to study the RPM phenomenon. Many studies have addressed the connection of project managers' skills and competence to project success. Often these skills are not learnt before working life because they cannot be learned by reading a book or in a lecture hall. Therefore, real-life experience should be provided for the students during their studies. RPM affects project success, and, hence, by recognizing the reasons that cause RPM

we may prevent many adverse consequences that RPM might subject the project to. One possible reason for replacing the project manager during a project is the project manager's inadequate project management and leadership skills. RPM research supports the educational model of project management by producing knowledge about the phenomenon. This knowledge can be exploited in designing a project management education model, which, in turn, produces experiences that can be used for developing a successful RPM model. The issues of how academic project management education can support IS project success are discussed in Articles 1 - 3. The phenomenon of RPM during a project and theories for studying it from different perspectives are discussed in Articles 4 - 8.

5 OVERVIEW OF THE ARTICLES

The research consists of a collection of reviewed articles presented as full papers in various forums. This section introduces the included articles with respect to their role and contribution for the study. For each article, the research objectives and methods are discussed and then the content and results are briefly described.

5.1 Article 1: “Educating IT project managers through project-based learning: A working-life perspective.”

Tynjälä, P., Pirhonen, M., Vartiainen, T. and Helle, L. 2009. Educating IT project managers through project-based learning: A working-life perspective. The Communications of the Association for Information Systems, Vol. 24, Article 16, 270-299.

Research objectives and method

The purpose of the study is to examine the extent to which project-based learning at university corresponds to the needs of working life. More specifically, the aim is to answer the following research questions:

- 1) What kind of competences do project managers working in the field of information and communications technology need?
- 2) What kind of learning outcomes do project-based studies at university produce?
- 3) How do the self-reported learning outcomes of the project-based studies correspond to the identified needs of working life?

In addressing the research questions, data from three different sources were used:

- Questionnaire to information systems graduates
- Interviews with experienced project managers
- Interviews with students

Findings

Project-based learning provides students with a learning environment that prepares them well for their future work. A comparison of the views expressed by IS graduates, project managers and the students of information systems reveals both similarities and differences. There is a total overlap and unanimity with regard to two aspects of working-life requirements and learning outcomes: 1) domain-specific knowledge and 2) social skills. The latter are expressed in a variety of ways, but the message is the same: communication skills, the ability to engage in team work, and negotiation skills are essential in IT project management.

The perceptions of project managers show that a variety of skills and know-how is needed in working life, including understanding of different project types and clients, project process, economics and law, team and human issues, and communications skills. The subjects stressed that real-life experience should be provided for the students and self-knowledge should be developed.

The students indicated that, in general, they were acquiring the skills and knowledge that IT professionals considered the most important in their work. These include both domain-specific knowledge (in this case about project management in particular but also about other forms of domain knowledge) and more generic working-life skills such as the ability to communicate and engage in teamwork. A further important finding was that project-based learning appears to contribute to the strengthening of students' professional identity.

Summary and the relation to the whole

For successful projects, a variety of skills and know-how of the project personnel is needed. Real-life experience is vital in learning skills needed in a project manager's work. This poses challenges to educators and educational systems and suggests the use of some student-centered learning approach to learn skills and competencies needed in working-life. These skills are often critical to project success, and thus it is important to offer students chances to practice the skills during their studies.

5.2 Article 2: "Challenges of Supervising Student Projects in Collaboration with Authentic Clients."

Pirhonen, M. 2009. Challenges of Supervising Student Projects in Collaboration with Authentic Clients. Proceedings of the 1st International Conference on Computer Supported Education (CSEU) [CD-ROM], Lisbon, Portugal, May 23-26, 2009.

Research objectives and method

The purpose of the study is to explore the use of a project-based learning approach for learning skills needed in project work and to describe a supervision model. A literature review was carried out.

Findings

Project-based learning seems to be an acceptable approach for learning project management and group work, but it alone does not guarantee good learning result. Effective and competent supervision and guidance of students is a vital part of a project-based learning method.

Summary and the relation to the whole

Competent personnel are vital for project success. In addition, the characteristics, competencies and leadership skills of the project manager are critical to project success (Faraj and Sambamurthy, 2006; Bloom, 1996; Turner et al., 2005, Jurison 1999; El-Sabaa, 2001; Gillard, 2005; Turner and Müller, 2006). Therefore, development of a learning environment driven by working-life and enabling students to learn soft skills during their studies is important. The role of competent teachers who are familiar with working in co-operation with industry is a vital part of the project management course.

5.3 Article 3: "Learning Soft Skills in Project Management Course: Students' Perceptions."

Pirhonen, M. 2010. Learning Soft Skills in Project Management Course: Students' Perceptions. In Aramo-Immonen, H., Naaranoja, M. and Toikka, T. (eds.) Proceedings of Project Knowledge Sharing Arena, Scientific Track Project Days 2010, 31-41.

Research objectives and method

The objective of the study is to capture perceptions of students of how their soft skills develop during the Project Management Course designed around the principles of PBL. The following questions were asked: 1) Does the course based on the PBL approach support learning soft skills needed in a project manager's work? 2) What was the student's self-assessment of their soft skills level before and after the course?

The students filled out the questionnaires to rate their current skills in communication, teamwork, and personal development using a 5-point Likert-type scale, ranging from 1 (vaguely familiar) to 5 (known in depth). The

comparison of students' self-assessed soft skills competence before and after the course was analyzed by the nonparametric Wilcoxon signed-rank test.

Findings

The results show that students found their skills in communication, team work, and personal development significantly improving during the course. The most significant change was seen in the ability to perform in public, in written communication, meeting techniques and reporting.

Summary and the relation to the whole

The learning results from the courses based on the PBL model seem to be comprehensive and transferrable to the world of work. The qualifications of project personnel, especially the project manager's soft skills are critical in contributing to project success. PBL provides an effective educational model to learn these skills and prepares students for working successfully in projects.

5.4 Article 4: "Replacement of Project Manager during IT Projects - A Research Agenda."

Vartiainen, T., Pirhonen, M., Aramo-Immonen, H. and Liikamaa, K. 2012. Replacement of Project Manager during IT Projects - A Research Agenda. In Proceedings of the 18th the Americas Conference on Information Systems (AMCIS), Seattle, Washington August 9-11, 2012, paper 4.

Research objectives and method

The objective of the study is to propose a research agenda of specific theories for studying the phenomena of RPM. A theory-development approach based on Gregor's (2006) division of theories was used for formulating a research agenda.

Findings

The study proposes that Gregor's (2006) division between theories that describe, explain, predict, and prescribe would increase our understanding of the experience of RPM, of the reasons for RPM, on how to predict RPM, and of the different paths leading to RPM situations. In addition, the theories would provide the means for managing RPM in IT projects. Based on the findings, research questions to develop substantive theories were proposed.

Summary and the relation to the whole

In this study, a research agenda with four research questions to develop substantive theories on RPM in IT projects is proposed: 1) How is RPM in IT projects experienced? 2) When RPM occurs in IT projects, what happens and why, and how does it affect the stakeholders? 3) How can RPM in IT projects be predicted? 4) How can we manage RPM in IT projects? The results give directions and a theoretical base for further studies on project manager replacement.

5.5 Article 5: “Replacing the Project Manager in Information System Projects: What Knowledge Should be Transferred?”

Pirhonen, M. and Vartiainen, T. 2007. Replacing the Project Manager in Information System Projects: What Knowledge Should be Transferred? In Proceedings of the 13th the Americas Conference on Information Systems (AMCIS), Reaching New Heights, [CD-ROM], Keystone, Colorado, August 9-12, 2007.

Research objectives and method

The objective of the study is to determine what knowledge should be transferred when the project manager is replaced in an ongoing IS project. The interviews of twelve experienced project managers were analyzed to find out about the knowledge that should be transferred from the outgoing manager to his or her successor. The study is descriptive in that the categories of perceptions are reported and exploratory (Saunders et al. 2000, 97) in that the aim is, first, to identify the critical issues involved and, then, to redefine the research question for future research.

The following questions were asked: *Describe what knowledge should be transferred to the successor project manager? What knowledge is critical? When the interviewees described their ideas, they were prompted to describe, in more detail, what they meant: Would you please describe in more detail what you said? and What else comes to mind?*

The interviews were recorded and transcribed. For the analysis of the transcripts, interpretive content analysis was applied. First, the interview transcripts were analyzed separately and tentative categories were produced. Then, the results were compared and the final categorizations generated.

Findings

The study reveals the kind of information that should be transferred in case of a project manager replacement. The results suggest that knowledge on management issues, on client organization, on decisions made, on team members, and on working atmosphere should be transferred whereas transfer of

unnecessary burden should be avoided. Based on the results, more in-depth research is needed because in different projects the criticality and effects of replacing the project manager are different and the criticality of knowledge transfer in such a situation also differs. Moreover, the causes for the replacement of the project manager and its effects to the process of knowledge transfer should be investigated. Future research should also consider the perceptions of senior managers and how previous and subsequent project managers experience the replacement.

Summary and the relation to the whole

The article describes the vital knowledge that needs to be transferred from the outgoing manager to his or her successor. Transferring this knowledge is one of the essential parts of handling RPM successfully. The findings give bases to answer the question "How to manage RPM in IS projects" presented in Article 4.

5.6 Article 6: "How is Project Success Affected by Replacing the Project Manager?"

Vartiainen, T. and Pirhonen, M. 2007. How is Project Success Affected by Replacing the Project Manager? In G. Magyar, G. Knapp, W. Wojtkowski, W. G. Wojtkowski, J. Zupancic (eds.) *Advances in Information Systems Development, New Methods and Practice for the Networked Society*, Springer-Verlag: New York, 397-407.

Research objectives and method

The objective of this paper is to obtain a tentative view on the issue of replacing the project manager during an on-going project and on the critical issues that were affected by the replacement of the project manager. Ten experienced project managers were interviewed during the year 2006 on the subject from the perspective of project success. Open-ended interview questions were used in order to encourage the subjects to describe all of the meaningful issues related to the research topic. The following questions were asked:

- *What issues are critical factors in relation to project success?*
- *Describe what comes to your mind on the subject of replacing the manager of a project-in-progress.*
- *What issues are affected by the replacement of the project manager? Which of these are critical in relation to the project success?*

The interviews were recorded and transcribed. For the analysis of the transcripts, interpretive content analysis was applied. First, the interview transcripts were analyzed separately and tentative categories were produced. Then, the results were compared and the final categorizations were created.

Findings

The results indicate that the reasons behind and the situations that lead to RPM can be divided into two categories:

- Replacing the project manager to rescue a troubled project
- Replacement of the project manager as a part of the process.

In addition, the paper introduces three broad categories of critical factors in relation to project success in case of a replacement:

- The management perspective (shared objectives, management of resources, change management, the commitment of the client and the project team, and communication and interaction between the parties)
- The human-issues perspective (relationships between people, motivation and attitude, competence, and trust) and
- The context perspective (understanding the business operations of the client and the context of the system use).

Moreover, the replacement affects the project's schedule and cost, team spirit and personal chemistry, and communications.

Summary and the relation to the whole

Summarizing, this paper reveals the reasons for the replacement of the project manager and explores the project success factors in case of such replacement. The findings show that replacement affects the personal relations among all parties and has impact on project success. It highlights the importance of communications in a successful replacement. As findings indicate, RPM has effects on project success if not implemented professionally. This finding emphasizes the importance of handling RPM in a controlled way.

5.7 Article 7: "Replacement of the Project Manager Reflected through Activity Theory and Work System Theory."

Vartiainen, T., Aramo-Immonen, H., Jussila, J., Pirhonen, M. and Liikamaa, K. 2009. Replacement of the Project Manager Reflected through Activity Theory and Work System Theory. In Song, W., Xu, S., Wang, C., Zhong, Y., Wojtkowski, W., Wojtkowski, G. and Linger, H. (eds.) *Information Systems Development, Asian Experiences*, Springer: New York, Dordrecht Heidelberg, London. 111-121.

Research objectives and method

The aim of the study is to add to the research on replacement of the project manager (RPM) two theories: social-cultural-historical activity theory and work

system theory. Based on literature review, a brief characterization of the role of the project manager is presented and an analysis of how activity theory and work system theory are applied is outlined.

Findings

The paper shows that both activity theory and work system theory are applicable for future studies on the replacement of the project manager (RPM). The strength of activity theory is that it describes learning and change in organizations and the dynamics between the project manager and the project organization in a project environment. Work system theory describes the project structure as a work system. It includes information system elements that are not considered in activity theory.

Summary and the relation to the whole

The paper shows the suitability of social-cultural-historical activity theory and work system theory in studying a known phenomenon of the replacement the project manager (RPM) in an ongoing project. Based on the findings, activity theory will be used as a theory in the further studies of the phenomena of project manager replacement because of the flexibility of its basic concepts and the flexibility of the level on which an activity can be observed.

5.8 Article 8: "Why Project Managers are Replaced in Information Technology Projects: Contradictions that Explain Replacements? "

Vartiainen, T., Pirhonen, M. Liikamaa, K. and Aramo-Immonen, H. 2013. Why Project Managers are Replaced in IT Projects: Contradictions that Explain Replacements. Submitted to Journal of the Association for Information Systems (JAIS) 20th June 2013.

Research objectives and method

The aim of the paper is to find out the underlying reasons behind the replacement of an IS project manager. The data consist of 49 subjects' perceptions, 30 subjects' perceptions via interviews and 19 subjects' perceptions via a questionnaire or email (six interviews and the questionnaire responses overlap). The interpretation on project was produced via AT. The interpretation served as a framework to identify the disturbances and their underlying structural tensions. The disturbances and consequences were identified from empirical data.

Findings

The results show various underlying reasons of RPM in IT projects. According to our interpretation, disturbances that emerge in the data, i.e., contradictions that represent the structural tensions that constitute RPM result from personal life situations becoming inconsistent with the project, the style of interpersonal conflict management not supporting project management success, the style of managing and leading organization not supporting project management success, and project portfolio management being inconsistent with project management success.

Summary and the relation to the whole

The analysis reveals four contradictions behind RPM. Recognizing the pivotal contradictions is a continuation of the previous study reported in Article 6.

5.9 About the joint articles

The author of this thesis wrote Articles 2 and 3 by herself. In the other papers, the author's contribution was the following:

Section 2.1 of Article 1 was mainly due to the author, Päivi Tynjälä being the main author of the paper. Furthermore, the author interviewed five project managers and transcribed the interviews. Tero Vartiainen produced a preliminary classification of the issues that emerged from the interviews, which the author then reviewed. In addition, the author gave constructive feedback during the writing of the paper.

In Article 4, the author was the main contributor for the chapter "Related Literature" and an equal co-author in writing the chapter "Research Agenda for RPM in IT Projects".

Article 5 was co-authored with Tero Vartiainen. The author contributed the major part of the theoretical background about knowledge management. For the study that the article dealt with, the author and Tero Vartiainen had an equal responsibility in planning the data gathering, and interviewing the project managers. Both authors independently analyzed the interviews. The results were compared and, after a critical discussion, agreed upon. The article was written in a collaborative manner.

The theoretical background for Article 6 was done in co-operation with Tero Vartiainen, Tero Vartiainen being the main author. Planning the data gathering, interviewing, and the analyzing process were similar to that in Article 5. Both authors contributed equally to the writing process.

In Article 7, both the author and Tero Vartiainen contributed equally to the writing of Chapter 2. In addition, the author gave constructive feedback during the writing of the paper.

In Article 8, the author was the main contributor for the chapter “Activity Theory”. In addition, she interviewed 15 project managers and independently analyzed all the data for the paper.

6 DISCUSSION OF THE RESULTS

The purpose of this dissertation is to explore how IS projects can be supported to attain success. First, academic project management education was studied in order to learn how it can support IS project success. Then, replacement of the project manager (RPM) during an IS project was examined. Finally, theories suitable for studying the RPM phenomenon were explored.

6.1 IS project success related to academic education

Successful project management is dependent on the project managers' competence (Whittaker 1999). A project manager needs not only to understand many facets of the business aspect; also managerial and leadership skills are needed to motivate the team in order to ensure project success. For example, human factors like the competence and skills of the project manager and project personnel have been seen as significant project success factors (e.g., Pinto and Slevin 1988, Jugdev and Müller 2005, Kirsch 2000, Belassi and Tukul 1996, Belout and Gauvreau 2004).

Designing academic studies to teach "human skills" - often referred to as soft, generic, or people skills (see e.g., Faraj and Sambamurthy 2006, Wateridge 1997, von Hellens, Wong and Orr 2000, El-Sabaa 2001, Brewer 2005, Gillard 2005, Turner and Müller 2006, Joseph, Ang, Chang and Slaughter 2010) during graduate studies may support project success. Real-life experience in working-life environment is an essential part of learning human skills needed in the project manager's work. These findings are similar to study of Crawford (2005), who states that practice is a valuable source of knowledge about how to manage projects. According to several studies, project-based learning (PBL) provides students with a learning environment that prepares them well for their future work (e.g., Helle, Tynjälä, Lonka and Olkinuora 2007, Helle, Tynjälä, Olkinuora and Lonka 2007, Tynjälä, Slotte, Nieminen, Lonka and Olkinuora 2006).

The research question “*How project management success in IS projects can be supported by academic project management education?*” was divided into two research sub-questions:

RQ1-1: What are the vital skills and competences contributing project management success? The aim of this question is to find the vital skills needed in IS projects. The findings of this study reveal that a variety of skills and know-how is needed for an IS project to be successful. These include understanding of different project types and clients, project process, economics and law, team and human issues, the ability to communicate and engage in teamwork, leadership and negotiation skills, and domain-specific knowledge (in this case about project management in particular, but also about other forms of domain knowledge). Many of these skills cannot be learned by studying them in a book or a lecture hall; as the research subjects (experienced project managers, see Article 1) emphasized, real-life experience should be provided for the students for the purposes of managing real-life projects.

RQ1-2: “How do the learning outcomes of project-based studies correspond to the needs of successful project management?” addresses the need to assess and to develop education better, responding to the needs of working-life and also seeking to identify ways to attain the skills. A student-centered learning approach and real-life experience is vital for learning the skills needed in a project manager’s work. The findings in Articles 1, 2 and 3 indicate that project-based learning studies correspond to working-life needs by enhancing students’ skills needed in successful project and project management. Our findings are consistent with those of the studies of Kjaersdam (1994) and de Graff and Kolmos (2003).

The students indicated that, in general, they were acquiring the skills and knowledge that IT professionals considered the most important in their work. The present results suggest that the students learned soft skills like communication and teamwork during their project management course. Leadership is expressed through the communication process, and developing effective communication skills is perhaps the most challenging component of a project manager’s soft skills. These skills are crucial for successful project management, particularly in turning around runaway projects. In addition, project-based learning appears to contribute to the strengthening of students’ professional identity.

6.2 IS project success and replacement of project manager

Replacing the project manager during an IS project is not uncommon, and it is a critical incident that affects the success of the project. Changes in management and personnel turnover during the project present challenges for IS projects and loss of key personnel like that of the project manager during a project may give rise to tremendous negative impacts on the productivity of the project (Lyytinen and Hirschheim 1987, Dey, Kinch and Ogunlana 2007, Keil et al. 1998,

Sauer, Gemino and Reich 2007). The project manager is accountable for the performance and project management success. If costs and the schedule are overrun or the project objectives are not accomplished or if there is a danger of such an eventuality, there may be pressures for RPM (cf. connection between top management turnover and organizational performance; Murphy and Zimmerman 1993, Coughlan and Schmidt, 1985, Leker and Salomo 2000, Shen and Cannella, 2002). On the other hand, the replacement will affect the project's costs and schedule, especially if the successor lacks the leadership skills needed.

The objective of the research question *"What are the reasons and effects of replacing the project manager during a project on IS project management success?"* is to explore the underlying causes behind the project manager replacement. The results indicate that there are a number of reasons that can lead to RPM. For example, the project manager's personal life situation may become inconsistent with the project, the competence of the project manager may prove inadequate (e.g., inadequate interaction skills, pressure tolerance), the client might demand a replacement, the project manager's experience, skills and competencies could be inadequate, or the project manager could be needed in another project within the organization. In addition, some executives may demand a replacement if the project escalates (e.g., cost and schedule overrun) or the project's objectives are not accomplished. RPM affects project management success, the project's schedule and cost, communications, team spirit and personal chemistry.

6.3 Theories suitable for studying project manager replacement

Several theories can be used in studying management replacement. In this study, in order to find an answer to the question *"What theories seem to be suitable for studying the RPM phenomenon in a more detailed level?"*, Alter's (1999, 2002) Work System Theory, Engeström's (1987) Activity Theory (AT) and Gregor's (2006) theories were investigated. Based on the findings, all these theories proved to be suitable for studying of the phenomenon. AT seems to be applicable because of the flexibility of its basic concepts and the flexibility of the level on which an activity can be observed. The strength of AT compared to work system theory is that it describes learning and change in organizations and the dynamics between the project manager and the project activity system in a project environment. The concept of contradiction, in particular, provides rich insights into system dynamics. Moreover, concepts from AT provide an analytical framework when trying to understand the phenomena of project manager replacement and to develop project management education. Gregor's theory seems promising for analyzing, explaining and predicting the phenomenon of project manager replacement.

7 CONCLUSIONS, LIMITATIONS, AND FURTHER STUDY

This dissertation investigates the role of the project manager and its influence on project success. The projects are becoming more complex, and failure rates for IS projects are high. Managing IS projects is a challenging job, and a project manager is the key person in accomplishing project success. Competence and skills of project managers play an important role in project success. These skills cannot be acquired only by book-learning. Marketplace-driven student projects using the project-based learning method has proven to be a successful educational approach for learning the essential skills needed in managing projects successfully. Replacing the project manager (RPM) in an on-going project is not uncommon. Our findings suggest that RPM during project affects the project's success. The findings also corroborate the expectation that success is more likely if the previous project manager identifies the vital project knowledge and transfers it to the successor manager. The research improves our understanding of the importance of the role of the project manager in IS project management.

7.1 Contribution to the research and practice

The key findings of this study have implications for researchers and practitioners in the IS field. This dissertation considers three well-established theories and shows their suitability in studying IS project management, especially the phenomenon of replacement of the project manager during a project. The results indicate that RPM affects to the project's success, and more attention should be paid to the replacement. In addition, applying Gregor's division between theories provides the means for managing RPM in IS projects.

Our results provide specific guidance to IS project managers by suggesting that more attention should be paid to the replacement of the project manager and the causes behind RPM. Senior management is responsible for previewing

the “early warning signs” (see more Kappelman, McKeeman and Zhang 2006). Therefore, awareness about the contradictions behind RPM is vital in order to manage the RPM process in a controlled way to ensure success. In addition, academic project management education needs to pay attention on the use of the project-based learning model that offers students real-life experience.

7.2 Limitations

The aim of the study was to increase understanding of the phenomenon of replacement of the project manager in an ongoing project, not to obtain generalized results. However, a number of limitations need to be recognized. More data is needed to produce a comprehensive picture about the replacement of the project manager. The environmental context of the project has to be examined before any conclusions can be drawn about RPM. Descriptions of the project’s characteristics, such as size, duration, type and structure need to be considered when exploring the reasons and consequences of the replacement. In addition, more data from project management courses carried out over several years by now is needed to confirm the learning result.

7.3 Further study

Based on what we have learned during this dissertation study, there are a number of interesting ways to extend the research from a different point of view. Clearly, there is a need for further research and development of IS project management education. Future studies may benefit from employing widely used activity theory in the fields of learning and teaching to deeper investigate project management education, applying a project-based learning approach. Particularly the concept of contradiction (“historically accumulating structural tensions within and between activity systems” (Engeström 2001, 137) provides rich insights into system dynamics. Moreover, concepts from AT provide an analytical framework when trying to understand, both during studies and in “real world”, the phenomena of project manager replacement to develop project management education. Exploration of the RPM process during the project management course and its comparison to an RPM incident in real-life might prove especially interesting.

Developing project management studies by a more profound use of activity theory will give the means to recognize contradictions and to develop learning environment to better meet the competencies needed in IS project management in working life. Future studies may benefit from a deeper investigation of the replacement process uncovered in this research. An interesting question for further research concerns the effect of the previous position of the successor project manager in a replacement situation: would the

effect be different if the successor came from the same project or the same organization rather than from outside the organization? Future research could take advantage of studying the context of the replacement in relation to different types of project (size, duration, status etc.). In addition, interviewing project managers who are new to a project and asking them about what they did not know when entering the job, what knowledge would have been beneficial and how the transferring process was carried out would validate our findings.

YHTEENVETO (FINNISH SUMMARY)

Tietojärjestelmillä on huomattava taloudellinen merkitys yritysten toiminnassa. Tietojärjestelmäprojektien onnistumista tai epäonnistumista koskevat tutkimukset kuitenkin osoittavat, että useat projektit edelleen epäonnistuvat. Epäonnistumisen taustalla ovat useimmiten johtamiseen, erityisesti ihmisten johtamiseen, liittyvät tekijät, ei niinkään tekninen osaamattomuus. Kokenut ja kyvykäs projektipäällikkö on keskeinen tekijä projektin onnistumisessa.

Tämän väitöskirjatutkimuksen tavoitteena oli tutkia, kuinka tietojärjestelmäprojektin onnistumista voidaan tukea. Tarkastelun kohteiksi on otettu projektin johtamisen koulutus yliopistossa sekä projektipäällikön vaihtuminen projektin aikana. Lisäksi tutkimuksessa etsittiin teorioita, jotka soveltuvat projektipäällikön vaihtumisen tutkimiseen. Tutkimuksessa on käytetty sekä laadullisia että määrällisiä menetelmiä.

Projektijohtamisen koulutuksen tavoitteena on antaa opiskelijoille tietoja ja taitoja, joita tarvitaan projektityössä ja projektin johtamisessa. Projektin johtamisessa tarvitaan erityisesti ihmissuhdetaitoja, joista keskeisiä ovat kommunikointi, kuunteleminen, palautteen antaminen, yhteistyökyky, ongelmanratkaisukyky sekä ristiriitojen ratkaiseminen. Näitä taitoja ei opita pelkästään kuuntelemalla luentoja tai lukemalla kirjoja vaan käytännön kokemuksen kautta. Pedagogisena ratkaisuna projektiperustainen oppimismenetelmä tarjoaa oppimisympäristön, jossa hyödynnetään yritysten aitoja kehittämistehtäviä. Tutkimuksen tulokset osoittavat, että tehtävien ratkaiseminen opiskelijaryhmässä yhteistyössä asiakasyrityksen henkilöstön kanssa mahdollistaa projektin johtamisessa tarvittavien taitojen oppimista jo opiskeluaikana.

Projektipäällikön vaihtuminen kesken projektin on varsin yleinen ilmiö. Vaihtumisen taustalla on moninaisia syitä: projektipäällikön riittämättömät taidot, projektipäällikön henkilökohtainen elämäntilanne ja työn vaatimukset ovat keskenään ristiriidassa, asiakas vaatii vaihtoa tai projektipäällikköä tarvitaan yrityksen toisessa projektissa. Projektipäällikön vaihtuminen vaikuttaa projektin onnistumiseen, aikatauluun ja kustannuksiin, viestintään, tiimin ryhmähengen ja henkilökohtaisiin kemioihin. Tutkimuksessa tarkastellut teoriat, Engeströmin toiminnan teoria (Activity Theory), Alterin työjärjestelmäteoria (Work System Theory) ja Gregorin teoria, näyttävät soveltuvan aiheen jatkotutkimuksiin.

Tulosten perusteella työelämälähtöisiä projektin johtamisen opintoja voidaan suositella käytettäväksi pedagogisena ratkaisuna onnistuneen projektin johtamisessa tarvittavien taitojen oppimisessa. Lisäksi projektipäällikön vaihtumisen taustalla olevien ristiriitojen ratkaiseminen edellyttää, että vaihtamistilanne käsitellään suunnitellusti ja hallitusti.

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ORIGINAL ARTICLES

I

EDUCATING IT PROJECT MANAGERS THROUGH PROJECT- BASED LEARNING: A WORKING-LIFE PERSPECTIVE

by

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Päivi Tynjälä
University of Jyväskylä, paivi.tynjala@ktl.jyu.fi

Maritta Pirhonen
University of Jyväskylä

Tero Vartiainen
Turku School of Economics, Pori Unit

Laura Helle
Turku University Centre for Learning Research

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Communications of the Association for Information Systems



Educating IT Project Managers through Project-Based Learning: A Working-Life Perspective

Päivi Tynjälä

University of Jyväskylä, Institute for Educational Research

Email: paivi.tynjala@ktl.jyu.fi

Maritta Pirhonen

University of Jyväskylä, Department of Computer Science and Information Systems

Tero Vartiainen

Turku School of Economics, Pori Unit

Laura Helle

Turku University Centre for Learning Research

Abstract:

This study discusses project-based learning and describes a course that is designed around these principles. The study also examines the working-life requirements of today's IT project managers and assesses the potential of project-based learning in promoting the development of the necessary skills and knowledge for successful project management. The data were collected and combined from three different sources: Recent graduates (questionnaires, n=185) were asked to identify the most important skills they needed in their work; project managers (interviews, n=15) were asked their opinions of the contents and methods used when educating IT project managers; and students (interviews, n=58) were asked what they had learned during the project-based course. According to a comparative analysis of the three sets of data, the respondent groups were unanimous regarding two aspects of working-life requirements and learning outcomes: domain-specific knowledge and social skills. The graduates and the project managers saw these as vital in the work of IT professionals, and the students mentioned them as the most important learning outcomes. The findings suggest that project-based learning may provide students with a learning environment that prepares them well for their future working lives.

Keywords: project-based learning, project managers, project management, working-life skills

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Educating IT Project Managers through Project-Based Learning: A Working-Life Perspective

I. INTRODUCTION

The project manager is a key person in accomplishing project success, and the most important factor in successful project management [Bloom 1996; Cleland 1984; 575; Kezsbom et al. 1989; 181; Nicholas 1994; 189; Verner et al. 1999]. He or she manages all the critical project functions, including planning, organizing, staffing, directing, and controlling [Thayer 1987]. According to Nicholas [1994 172], the role of the project manager is so important that "without it there would not even be project management—the project manager being the glue holding the project together and the mover and shaker spurring it on."

Yet there appears to be an increasing shortage of appropriately qualified project managers. Many managers responsible for information systems (IS) projects are either untrained or poorly trained for their work [Maqsood and Javed 2007]. The Software Productivity Research Company (USA) has indicated that less than 25 percent of U.S. software project managers received any formal training in software cost estimation, planning, or risk analysis [Jones 1999]. In a similar vein, Pinto and Kharbanda [1996] report an increased demand for qualified project managers [cf. Jurison 1999]. Thus, in practice it is hard to recruit an experienced project manager with the necessary broad experience and managerial skills.

What, then, are the knowledge and skills that successful project management in information technology (IT) sector¹ requires? A broad answer to this question is provided in three studies. The first was conducted by Lee et al. [1995], who reviewed the IS literature, conducted discussions in focus-group meetings, and interviewed IS managers. As a result they defined the following four broad categories of critical knowledge and skills required of IS professionals:

- *Technical Specialties Knowledge/Skills*: being up to date with rapidly changing technology;
- *Technology Management Knowledge/Skills*: where and how to deploy information technologies effectively and profitably;
- *Business Functional Knowledge/Skills*: the need to apply information technology to serve business goals and to reengineer business processes before the adoption of new IS;
- *Interpersonal and Management Knowledge/Skills*, or behavioral knowledge.

The second study was conducted by Abraham et al. [2006], who interviewed 104 senior IT managers with extensive knowledge of IT and IT workforce needs. From the results, they estimated that the skills that would be important by 2008 would be related to the business domain, sourcing, IT administration, project management, and technical know-how (IT architecture/standards and security). Critical entry-level capabilities include programming and other technical skills, but communication and industry knowledge were also cited as critical. The studies reviewed above show that the project manager is expected to manage complexity in projects. This view is supported by Xia and Lee [2004], who developed a taxonomy for the complexity of IS development projects (ISDPs), including technological, organizational, dynamic, and structural complexity. They argue that ISDP complexity and project performance are both multidimensional; hence the project manager must understand how the complexity of the ISDP affects project performance.

Given the role of the IT project manager, interestingly, many argue that technical skills are not as important as non-technical abilities in the areas of teamwork and communications, and self-awareness [Faraj and Sambamurthy 2006; Wateridge 1997; von Hellens et al. 2000; El-Sabaa 2001; Brewer 2005; Gillard 2005; Turner and Muller 2006]. These kinds of skills are often referred to as "soft skills" [e.g., Muzio, Fisher, Thomas, and Peters 2007; Sumner et al. 2006], "generic skills" [e.g., Canning 2007; Dunne, Bennett, and Carré 2000], or "transferable skills" [e.g., Fallows and Steven 2000]. The everyday assumption has been that they can be taught at school and transferred to other contexts. However, contrary to common belief, generic skills are highly context-dependent [Dunne et al. 2000] and, as Bereiter and Scardamalia [1993] state, they are very difficult to teach and their transferability to new situations must be questioned. Recent studies conducted among university graduates with some years of work experience have given support to these ideas. Such studies have shown that graduates often find their "generic skills" such as communication and social skills inadequate, and that the majority of them learn the most important skills at work

¹ For reasons of simplicity we use information technology (IT) as a general term to mean the whole computing field. As used in this study, the terms *IT sector*, *IT professional* and *IT project manager* should therefore be interpreted as general expressions. A precise division of the fields of computing is found in Computing Curricula 2005: Computing is divided into computer engineering (CE), computer science (CS), information systems (IS), information technology (IT), and software engineering (SE) disciplines.

[Tynjälä et al. 2006; Stenström 2006]; therefore, an important challenge for higher-education institutions is to develop pedagogical practices that allow students to participate in working life and to confront real-life problems as an integral part of their studies. Only in this way will it be possible to develop the kind of knowledge and competence that is needed in the world of work. We argue that this challenge cannot be met by confining university pedagogy to traditional methods such as lectures and text-book study, and we have to create new kinds of learning environments for students. Bereiter and Scardamalia [1993] argue as follows:

If we want students to acquire the skills needed to function in knowledge-based, innovation-driven organizations, we should place them in an environment where those skills are required in order for them to be part of what is going on.

In the present paper we claim that, at least in terms of learning the skills required in a project manager's work, the above-mentioned challenge can be met if a project-based learning approach is adopted. Project-based learning takes different forms. In some courses the project work is carried out with a real-life client [Green 2003; Watson and Huber 2000; Cotterell and Hughes 1995; Brown et al. 1989], while in others the instructors create the assignments [Scott et al. 1994]. The focus in the present article is on work-related project learning carried out in collaboration with authentic clients.

In the following sections, we first outline our theoretical framework for project-based learning on the basis of recent research on learning. We then present a particular model of this pedagogical approach based on studies in the field of information systems design. The rest of the article describes our empirical research examining the extent to which project-based learning corresponds to the needs of working life in the IT sector, and in the work of project managers in particular.

II. A THEORETICAL FRAMEWORK FOR PROJECT-BASED LEARNING

Our theoretical starting point is the constructivist view of learning according to which learning occurs not as a result of passively receiving information, but as a result of the learner's active cognitive and social processing of knowledge [see e.g., von Glasersfeld 1984, 1995a,b; Duffy et al. 1993; Tynjälä 1999]. It is acknowledged that constructivism is not a unified theory; it rather subsumes many different positions such as radical or cognitive constructivism, social constructivism or the socio-cultural approach, symbolic interactionism, and social constructionism. What is common to these diverse views is the metaphorical description of learning as a building process in which knowledge is actively constructed by individuals and social communities in a process of negotiating meaning. [e.g., Duffy et al. 1993; Phillips 1995; Prawat, 1996, 2000; Steffe 1995; Tynjälä 1999; von Glasersfeld 1984, 1995a, 2007; Geelan 2006].

The most important pedagogical implications of constructivism can be summarized as follows [cf. Tynjälä 1999]:

- The significance of learners' previous knowledge, beliefs, conceptions and misconceptions is emphasized and taken into account in the instructional design [Dochy 1992; Duit 1995; Vosniadou 1992a,b, 1994; Jonassen et al. 2005];
- Attention is paid to learners' meta-cognitive and self-regulative skills and knowledge [Boekaerts 2002; Boekaerts and Cascallar 2006; Brown 1987; Vermunt 1995, von Wright 1992];
- Negotiation and the sharing of meaning through discussion and different forms of collaboration are emphasized [Boekaerts and Minnaert 2006; Dillenbourg 1999; 2007; Gergen 1995];
- Multiple representations of concepts and information is utilized [Feltovich, Spiro and Coulson 1993; Lehtinen and Repo 1996; Lehtinen and Rui 1996; Spiro et al. 1995; van Someren et al. 1998];
- The situational nature of learning is taken into account and thus authentic or simulated environments are preferred, and knowledge acquisition and use are integrated [Eraut 2004; Helle et al. 2006; Lave and Wenger 1991; Mandl et al. 1996; Markovitz and Messerer 2006];
- Learning processes are characterized by problem-solving, the active processing of information (activated learning), and the production of concrete artifacts in the course of the learning process [e.g., Bereiter and Scardamalia 1993; Bereiter 2002; Bruner 1996; Jonassen and Hernandez-Serrano 2002; Lonka and Ahola 1995; Lonka 1997];
- The role of the teacher is to support and facilitate the learning process of students [e.g., Adams 2006; Prawat 2000; von Glasersfeld 2007];
- Assessment procedures are embedded in the learning processes, focus on authentic tasks, and take into account the learners' individual orientations and foster their meta-cognitive skills [Biggs 1996; Boud 1995; Dochy and Moerkerke 1997; Hansen 2004].

Recent models of project-based learning are very well in line with these pedagogical principles. The project-based method is a comprehensive approach to instruction. It is a learning model that involves students in problem-solving tasks and allows them to actively build and manage their own learning. The underlying principle is the assumption that learning occurs during unstructured and complex activities [Helle et al. 2006]. Project-based learning itself does not always require authentic work tasks [Blumenfeld et al. 1991]; however, at university level, real-world work assignments are often utilized in order to achieve mandated performance objectives, and to facilitate individual and collective learning [Smith and Dods 1997]. The present study reports on the application of the constructivist design principles described above in a project-based learning course in information systems, as shown in Table 1.

Characteristics of constructivist learning environments	Application in the project based course
Taking into account students' previous knowledge and conceptions	At the beginning of the course: reflection on previous experiences and conceptions of project work through writing and discussion
Paying attention to students' meta-cognitive and self-regulative skills	Having students reflect on their own learning in learning journals and weekly discussions with the university teacher Having students plan a system for the monitoring of their time management
Negotiation and the sharing of meanings through discussion and collaborative learning	Carrying out projects in groups. Supporting collaboration through mentoring. Regarding the group as the basic unit of working and learning
Problem solving and the construction of artifacts	Project work itself as joint problem solving involving planning and developing a concrete artifact
Situated learning; an authentic or simulated learning environment	Commissioned project assignments from authentic clients
The teacher as a facilitator of learning	Regular discussions with the university teacher and the workplace mentor
Process-driven assessment fostering meta-cognitive skills	Student self-assessment focusing on the learning process + assessment by the teacher and the workplace mentor

Helle et al. [2006a] describe five significant features of project-based learning that distinguish it from other forms of learning. First, there is the idea that a problem or question serves to drive learning activities. Second, the construction of a concrete artifact distinguishes project-based learning from problem-based learning (PBL), in which students usually work on paper cases without any concrete end product. Third, learner control of the learning process leaves scope for decisions regarding pacing, sequencing and actual content. The strength of this is that it motivates and gives students the possibility to work toward a solution in their own idiosyncratic ways. Fourth, the contextualization of learning is evident in project-based courses, since a project commissioned by a business organization will provide students with an authentic learning environment. Fifth, the project method allows the use and creation of multiple forms of representation, that is, the combined use of knowledge in different forms (abstract, concrete, verbal and visual, for example). Finally, Helle et al. [2006] note that projects are complex enough to induce students to generate questions of their own. In the course of designing problems and generating questions they are likely to develop a sense of ownership of the learning process. This, in turn, results in increased motivation [see Helle et al. 2007].

Developing generic skills such as teamwork is an integral element in many models of project-based learning: teamwork is an inherent part of the project. Students involved in projects practice a vast range of skills in areas of project management, teamwork, and communications technology—and also in self assessment. Often collaborative skills are put into action by the collaborative nature of project management. In fact, recent studies have suggested that project work may have many educational and social benefits [Moses et al. 2000], such as the development of communication skills [Pigford 1992; Fritz 1987], along with team-building and interpersonal skills [Roberts 2000; Ross and Ruhleder 1993].

Project work in the computing fields gives students the possibility to prepare for professional practice by applying "programming-in-the-large" and by producing plans, managing schedules, interviewing users and meeting project deadlines [e.g., Oliver and Dalbey 1994; Sumner 1987]. Moreover, project work makes it possible for students to apply theoretical knowledge to practice [Rebelsky and Flynt 2000; Byrkett 1987], which is important for the development of expertise [Bereiter and Scardamalia 1993; Leinhardt et al. 1995; Tynjälä et al. 2003; Tynjälä 2008a, 2008b]. In terms of expertise, it is also worth mentioning that project studies may enable students to participate in the creation of new knowledge rather than confining themselves to the acquisition of existing knowledge. According to Hakkarainen et al. [2004], the knowledge-creation perspective is the most dynamic aspect of expertise, from both the individual and the societal perspective. For this reason it is important to support knowledge-creation activities during university studies [see also Helle et al. 2006].

In the next section we shall describe the particular model of project-based learning under investigation.

A Description of the Project-Based Learning Model and the Course

Naturally there are different ways of organizing project-based learning and work-related project learning. In our study we focus on a particular model, developed at the Department of Computer Science and Information Systems at the University of Jyväskylä, Finland. The course in question is called the Development Project Course, and it is usually taken in the third year of studies.

The Model and the Learning Objectives

The main aim of the Development Project Course is to give the students the opportunity to gain authentic practical experience of information systems projects. The learning objective is to provide the learners with a comprehensive and realistic view of the work of information systems experts in both project management and implementation. Further objectives include familiarizing the students with the tools and methods of the project domain, ensuring that they acquire communication skills and teamwork competence, as well as project-management and planning skills. They work in close co-operation with the client in weekly meetings. During the collaboration the students are supervised both by client representatives and by university teachers. The basic idea or emphasis is that very specific technical guidance should come from the client whenever possible, whereas the university is responsible for more generic guidance (e.g., planning and reporting). In addition, guest lecturers from client organizations give lectures on topics of relevance to project management. The learning environment fosters project-based learning, the aim of which is to support students in attaining their learning objectives, which in this case include the acquisition of project-management skills, leadership and group-work skills, communication skills, and technical competence (see Table 2 for a more specific description of what constitutes these skills are and how they are acquired).

Table 2. The Objectives and Realization of the Project Course [adapted from Pirhonen and Hämäläinen 2005, p. 35]

Learning objective	What?	How?
Project-management skills	Project planning, risk management, scope management, follow-through of the project	Project plan, risk plan, phase plans and reports, weekly plans and reports, inspection meetings, steering-group meetings, acting as a project manager, lectures given by experts, theme seminars
Leadership and group-work skills	Goal-oriented and responsible action, recognizing the stages of group development, team spirit, team members' roles	Allocating the tasks equitable to the team for attaining project objectives, weekly meetings with the supervisor, team meetings, discussions, peer reviews
Communication skills	Negotiation techniques, meeting practices, skills in public performance, spoken and written communication	Communication plan, team meetings, meetings with the client, supervisors, and project managers; steering-group meetings, seminars, presentations, agendas, memos, minutes, e-mail
Technical competence	Knowledge of the project substance	Acquainting oneself with the project scope, identifying the training needs for carrying out an assignment, schooling oneself, planned use of the resources of the client and the support group



The Learning Environment and The Project Tasks

The learning environment is maintained in co-ordination with three parties—the student group, the university, and the client organization (Figure 1). A written cooperation contract between the three parties is drawn up before the project starts. It covers the subject matter (a description of the project objectives), the obligations and rights of the contracting parties, copyrights, guarantees and maintenance, confidentiality and the concealment of confidential information, payments and the payment schedule.

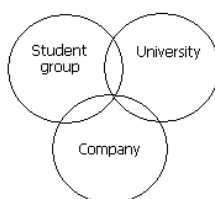


Figure 1. The Actors in the Learning Environment

The client typically represents a firm such as a software house or the IT department of an industrial organization. The tasks range from extreme coding projects to developmental projects and research. They are typically ill-defined and need to be clarified as the project proceeds. Four examples of project tasks follow. The texts have been translated from Finnish into English from the course website, where the students produce their project homepages [Vartiainen 2005]:

1. The task of the [name of a project group] group is to investigate the usage of EJB (Enterprise Java Beans) in n-layered environment. The goal is to examine the potential uses of EJB in delivering information between the client and the server components. In addition to this, the project group will program a small prototype.
2. The task of the [name of a project group] group is to investigate product management and different sectors of software engineering in [name of a client], and to analyze and describe the salient concepts and processes relating to them. In addition to this, the group will produce a report based on the concepts, methods, tools, and best practices found in the market, and which assesses the functionality of new operational models in managing infrastructure products in the workstation environment in [name of the client].
3. The purpose of the project is to implement an information-transportation protocol for [name of system], a client-server system developed by [name of a client] for reading and managing information about energy.
4. The task of the project is to map the security level of [name of a client] and to produce real recommendations and solution models for improving these security levels.

The Project Organization

The project organization comprises a group of between four and five students, supervisors, and client representatives (see Figure 2). The steering group is selected during the initial stage and consists of representatives of the client organization, the university (supervisors) and the project team (the project manager and secretary in turn). It represents the highest authority in terms of decision-making, and decides on matters concerning the plans and issues related to the redefinition of the project content. One of the client representatives chairs the group meetings and the project-team manager presents the state of the project. Experts or consultants may also be invited to the steering-group meetings.

Each project group has two supervisors from the university, one of whom is the vice-supervisor. These people are the facilitators and/or coaches who promote the collaboration and provide support and guidance. The supervisor also has an important role in promoting students' reflection on their work. Especially in the early stages of the project, the role of the supervisor is vital in supporting communication and cooperation with the client. The experiences of supervisors have shown that the start-up phase needs to be conducted in a systematic way if it is to contribute to project success. Supervisors guide processes of groups: a supervisor and a group meet in weekly

guidance meeting. The main objective of the meetings is to critically reflect on one's own way of working and learning. During these meetings, the weekly reports and plans are discussed. The project manager and team members report on the state of the project and compare the state of the project to the expectations in the project plan. Issues that can cause problems in carrying out the project are discussed as well. For the development of students' reflective evaluation, the groups are asked to formulate plans, track progress, construct and test alternative solutions and evaluate their hypothetical consequences. In addition, they weekly write up a learning diary that contains their reflection on their working and learning. The supervisors' duty is to create questioning culture among the group and to direct them to use actively instruction and expert recourses available. Supervisors only have responsibility for the fulfillment of the academic learning objectives, not for project results to the client. They guide the students in finding the essential aspects for carrying out the task. Decision-making is left to the group, although the supervisor can provide a timeline for the process. The support group includes the network set up by the client, which provides the project group with content-related professional help when needed.

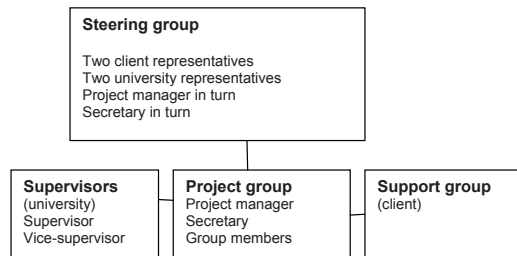


Figure 2. Project Organization

Duration

The project course lasts from the beginning of September to the end of March (26 weeks). The course starts with lectures and orientation exercises for the students. The students form their own groups of four to five members before the task-exhibition session at which the client representatives present the project assignments. After this session the student groups negotiate the distribution of the project tasks. During the course each student is expected to use 275 hours for implementing the project task and 125 hours for demonstrating project-work skills, including project leading, group work, and communication. The groups plan their work, complete the scheduled tasks, and produce deliverables. Each student is expected to take the role of project manager and project secretary. These roles rotate every month so that each member of the project team works in both roles once. In total, a five-student group uses 1,375 hours in planning and implementing the client project. The collaboration ends with a steering group meeting at which the results of the student project are accepted.

The Assessment

The aim of the assessment process is to recognize what the students learn during the project course. There are two assessment points, the first in mid-December after three months' work, and the final one at the end of the project in April. In terms of content, the assessment is grouped and structured around themes covering issues related to the process (group work, planning, and communication and co-operation), student attitude and the project outcome. The following coefficients are used for the assessment categories: process 70 percent (group work 25 percent, planning 25 percent, and communication and co-operation 20 percent), attitude 10 percent, and outcome 20 percent. The group process is assessed and each student is given an individual grade.

As part of the assessment process both the teams and the supervisor write a report in line with the given framework. The assessment is based on perceptions of teamwork and documentation of the project process (e.g., plans, reports, memos, and minutes). The project outcomes are assessed only by the client. Following the delivery of the written assessments, the supervisors and the team discuss them in order to establish the causes of success and failure. The course grades are determined based mainly on the debates that emerge in the discussion on the written assessment. Both supervisors and students have the right to suggest an individual student mark that is different from the collective mark given to the group. These personal marks are based on unanimous decisions.



The focus in the present study is on the project-based learning model described above, which is examined from the perspective of working-life requirements. For this purpose we collected data on these requirements from different sources, which we compared with the data gathered from the project-based course. In the following sections we present the more detailed research questions and describe the methodology of the study.

III. THE AIM OF THE STUDY AND THE RESEARCH PROBLEMS

The purpose of the study was to examine the extent to which project-based learning at university corresponds to the needs of working life. More specifically, we aimed to answer the following research questions:

1. What kind of competences do project managers working in the field of information and communications technology need?
2. What kind of learning outcomes do project-based studies at university produce?
3. How do the self-reported learning outcomes of the project-based studies correspond to the identified needs of working life?

IV. METHOD

In addressing our research questions we needed to utilize, combine and re-analyze data from three different sources. For the first one regarding the competences needed in the work of a project manager we administered a questionnaire to information systems graduates with between two and 10 years of work experience, and conducted interviews with experienced project managers, and for the second concerning the self-reported outcomes of project-based learning we interviewed students who had just completed the Development Project Course described above. Finally, in order to answer our third question we combined and compared the data collected from various sources. In the following we describe each method in more detail.

Questionnaire To Information Systems Graduates

The questionnaire study was part of a larger research project [Tynjälä et al. 2006] examining how university graduates perceive the qualifications and competences needed in their profession and how they see the role of university education in providing those skills. The target group consisted of 2,712 alumni from three Finnish universities with degrees in one of four areas: information systems, teacher education, general educational sciences and pharmacy. The response rate was 35 percent (n=955), which is typical for postal surveys: it was slightly lower for computer-science graduates, 27 percent (n=185). The questions concerned the graduates' work history, current job, work tasks, the skills they needed and their experiences of their university education. In the present study we focus on working-life competences. The respondents were asked an open-ended question:

What are the most important skills or qualities you need in your job?

The answers were classified into five categories [adapted from Väärälä 1995]: 1) domain-specific production and technical competences, which included domain-specific professional skills and knowledge; 2) motivational characteristics, which refer to personal qualities such as commitment, motivation, goal setting and aspiration; 3) adaptive characteristics, including adaptation to work requirements and pressures; 4) social skills such as communication skills, team-work skills, negotiation skills, representation skills and general people skills; and 5) innovative abilities, which refer to the skills needed in the development of work tasks and products and include creativity, innovativeness, problem-solving skills, developmental orientation and learning skills. The classification was carried out by a trained research assistant.

Interviews with Experienced Project Managers

Project managers with considerable working experience (five to 10 years) in software projects were interviewed during the years 2005 and 2006. The companies they worked for mostly represented large enterprises located in the regions around Tampere, Turku, Pori and Jyväskylä, in Finland. The interviews were carried out in two phases. First, the third author conducted a group-discussion exercise with five IT project managers in a large manufacturing company (in 2005). He presented the interview task at the start and asked prompting questions in order to move the discussion along. Second, 10 IT project managers from software houses were interviewed and asked the same question (in spring 2006): the second and third authors each interviewed five subjects. The age and gender profiles of the project managers, coded PM1...PM15, were (na = not available; F=female, M=male): na/M, na/M, na/F, na/M, na/F, 41/M, 42/M, 42/F, 59/M, 46/F, 50/M, 38/M, 35/M, 43/M, and 41/M. In order to obtain rich descriptions the authors formulated an open-ended interview question (the IT abbreviation was chosen as it is commonly used in Finland to refer to the computing field as whole):

Universities educate future IT project managers. What themes should be considered in the education and how should they be taught? (Recall your own education. What would you have wanted to learn?)

The second and third authors recorded and transcribed all the discussions and interviews. Interpretive content analysis as developed by Lacity and Janson [1994, p. 148] was then applied to the interview data. This approach takes into account the contextual circumstances in which the respondents frame their answers and the circumstances that influence the researchers' interpretations. The analysis proceeded as follows: the third author produced a preliminary classification of the issues that emerged from the interviews, which the second author then reviewed. After a few iterations they agreed on the final classification presented in the Results section.

Interviews with students

The first and the fourth authors interviewed 48 (83 percent) of the 58 students taking the Development Project course. Neither of the interviewers were instructors of the course. The semi-structured interviews covered the following themes: the students' learning orientations and subjective learning outcomes, the development of expertise, group processes, and the use of IT tools. In the present study we focus on experienced learning outcomes, in other words on what the students felt they had learned during the project-based course. A simple question was asked:

What did you learn during the project course?

The recorded and transcribed answers were analyzed in two phases: first, the fourth author coded the responses using a coding scheme derived from the data [see Helle et al. 2007], and secondly, the first and fourth authors reduced the categories to three basic groups.

Combining the data

In the last phase of our study we combined the data described above and made a comparative analysis. For this we compiled the main results of each sub-study in a table and examined the relationships between the views about the requirements of IT project managers (expressed by the project managers and information systems graduates) and the self-reported learning outcomes of project-based studies (expressed by the information systems students who had completed the project-based course).

V. RESULTS

The Information Systems Graduates' Views of the Skills Needed in their Jobs

Figure 3 shows the distribution of the respondents' answers to the question concerning the most important skills they needed in their current jobs. More than one third of the graduates from IS study program thought that innovative skills such as creativity, problem-solving skills, learning skills and developmental orientation were most often required, followed by domain-specific production and technical and social skills (mentioned by 26-27 percent). Motivational and adaptation skills were less often considered the most important. All in all, the findings suggest that in addition to managing domain-specific knowledge, IS professionals must have different kinds of innovative and social skills.

The Project Managers' Perceptions of the Content and Method of Teaching

The project managers' perceptions of what should be taught to future project managers fell into three broad categories: real-life experience of a diversity of projects, management, and interpersonal competence. It became evident that the project managers thought that the skills should be acquired through practical experience. The categories were as follows:

Real Experience of a Diversity of Projects

Students should understand how entire projects are managed in real life, and get a general picture of IT projects (e.g., diversity in terms of types of projects and clients, business, technical issues, and architecture). The interviewed project managers suspected that students would not acquire this kind of understanding in educational institutes. Project courses with real-life clients were mentioned as possible means for meeting these needs. The following three extracts exemplify these concerns:



PM1: "Generally, more problems emerge if you are a far too in-depth specialist at the beginning of your career. OK, you might find a very good job that matches it [your specialty] but the probability is quite small. I think it's more important that you have a solid general picture of things..."

PM6: "Preparing for the brutal reality because there is this gap between education and working life. ... There should be something concrete [in the education]. There should be problems from real life. Management by situation is a good example. Is a person strong and competent and so forth? How do you lead people in such situations?"

PM9: "They [students] should lead a project there [at the university]. Perhaps they do, I don't know. The kind of projects that involve outside parties, clients. After learning the theory they should implement a project that satisfies the client."

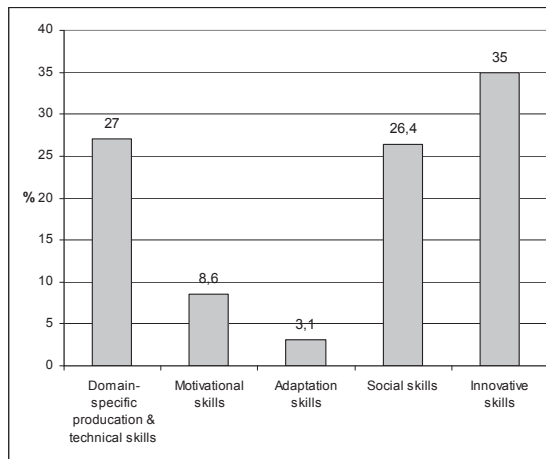


Figure 3. The Skills Needed most in IS Jobs according to IS Graduates with between Two and 10 Years of Work Experience (n=185)

Management Skills

The following management skills emerged in the project managers' perceptions:

- Planning the whole project
- Managing the project process and the critical work tasks (e.g., follow-up inspections)
- Making project offers
- Cost management
- Managing contracts
- Familiarity with the law

Two extracts follow. The first one refers to "making a project offer" and the second to "economics issues" as critical in the work of a project manager:

PM5: "When a new project manager joins our firm, I invite him or her to formulate a project offer with me and we devise four to five versions of it together. This is how they learn the basics. Then there are the legal issues so that you don't mess up with your project."

PM4: "Project economics are important in addition to the technical issues: money is the most significant bone of contention with the client".

Interpersonal Competences

In addition to the management skills that are targeted directly on attaining the results there is significant need to consider interpersonal competences. Many project managers expressed the concern that education does not deal with human aspects properly. Therefore they raised the following themes:

- Team work, team building
- Psychological issues (e.g., personality types)
- Communication skills
- The development of self-knowledge

The following example refers to the lack of concern for human issues in education:

PM8: "Many kinds of project-management software and courses exist but how to deal with people is not considered. After all, project success or failure depends on it and on how people feel after the project... For example, technical issues may differ but people always exist. This viewpoint has to be taken into account."

Communications skills were considered critical. Everything in a project was perceived to depend on how the project manager is able to communicate with the stakeholders. These skills were discussed in the group discussion among five project managers:

PM10: "There's something I have noticed. In a way it's a small issue but in practice it's very significant. Abilities as a public performer and presentation skills. How you present things is very important."

PM11: "And communication skills."

PM10: "Well, communication in general."

PM11: "That you are able to take the audience into account and how you get your ideas through."

Students should develop self-knowledge of their capabilities. This would help them to make the right choice between a prospective future career as a project manager or a technical specialist, according to the project managers' perceptions. The following extract exemplifies these concerns:

PM2: "From the beginning everyone should ask themselves if they want to be a gasbag who uses their time for caring and herding and keeping up communications and interaction and keeping people satisfied. You would be a kind of, how could I put it, a nurturer or a coach. Or do you want to be the center-forward who implements the technical work tasks. These are two completely different things and that's why everyone should ask themselves what they want to be".

Experienced Learning Outcomes in the Project-Based Course

The following categories of learning outcomes were formed on the basis of the data-driven qualitative analysis of the student interviews: 1) Domain-specific skills and knowledge; 2) A stronger professional self-concept and clear career prospects; 3) Client-related learning; 4) Communication with different people; and 5) Holistic managerial competence, including project management and an integrative view of building an information system [Helle et al. 2007]. In the following section, we shall describe these categories in more detail, and also give numerical data on how often these perceptions were mentioned by the students; however, it is important to keep in mind that the categories were formed on the basis of answers to open interview questions. It is a well-known fact that the frequencies of answers to identical questions can vary according to the data collection method. Open-ended questions yield much lower frequencies than ready-made statements. Because of this, the percentages or frequencies reported below should not be taken as statistical facts, but rather as an approximate indication of how common these perceptions were as spontaneous reactions. The purpose of the qualitative analysis was not to produce numerical information but to get a general outline of self-perceived learning outcomes—that is, a general idea of the kinds of outcomes that are possible.

Domain-Specific Skills

The vast majority of students, that is more than 80 percent, reported having applied and acquired domain-specific knowledge and skills during the Development Project course. They often specifically mentioned established ways of modeling or flowcharting (i.e. ways of describing a system), and programming. The majority also said that they had learned how to use new tools, and some mentioned learning a new programming language.

A Stronger Professional Self-Concept and Clear Career Prospects

Again, majority of students (more than 60 percent) felt that the project-based course had had a beneficial effect on their professional self-concept and had strengthened their identity as a (future) IT professional. This was often

experienced as increased self-confidence, as in the following citation: (ST8) "A massive increase in self-confidence in terms of one's competence. You saw that you could do something for real."

Client-Related Learning

Learning outcomes related to dealing with clients were often concerned with people skills. For example, 20 students out of 48 reported having learned how to get along with different clients, how to react when the client proposes sudden changes in plans, and how to clear up misunderstandings. Some also mentioned that they had learned to see things from the clients' point of view.

Communication with Different People

This category of learning outcomes resembled the previous one but included answers that explicitly referred to developing communication skills. For example, 16 students spontaneously mentioned that they had acquired skills in negotiating, collaborating, and giving presentations in the steering-group meetings. They also felt that they had learned how to communicate in a systematic way, and had gained insights into intra-group and external communication. Those who had dealt with foreign clients reported that they had learned more about the English language during the project, and some also mentioned learning how to communicate with non-professionals.

Holistic Managerial Competence

Learning about project management was one of the main goals of the Development Project course, and according to the student interviews this goal was very well achieved. Approximately a half of the students spontaneously mentioned project-management skills when asked about learning outcomes. They often described their learning in terms of systematic working procedures or resource management. However, there were differences between the project groups in how they approached resource management: some teams put considerable effort into trying different types of systems and seemed to gain experience of what works and what does not; by contrast, others reported that they did not much pay attention to resource or management techniques or tools.

Some students explicitly described their new insights into the project manager's role, for example: (STU53): "Well, at the beginning of the project [the project manager] naturally has to delegate tasks and arrange things and this perhaps requires a more commanding or dictatorial approach, whereas in the design phase it's important that the whole group participates and the project manager probably does not have such a dominating position that he would tell someone now you do this and that. Instead people have to decide together what to do."

Acquiring holistic managerial competence may also involve taking an integrative view of building an information system. This integrative learning was often articulated in terms of "project phases" or applying certain models of information systems design. In the following example a student makes an articulate connection with the design cycle: (STU4): "Well, right from the beginning and in our project plan we adopted the spiral model, in other words the systems-development model, which is based on iterations. We discarded the waterfall model right at the beginning, because it would not have been suitable for prototype development."

In the second phase of the analysis we further condensed the learning-outcome categories described above into three main groups: 1) domain-specific knowledge, 2) generic working-life competences, and 3) professional identity.

How do the outcomes of project-based studies correspond to the needs of working life?

Table 3 sets out the main findings of the analyses of the three independent sets of data.

A comparison of the views expressed by the IS graduates, project managers and students of information systems reveals both similarities and differences. There is total overlap and unanimity with regard to two aspects of working-life requirements and learning outcomes: 1) domain-specific knowledge and 2) social skills. The latter are expressed in a variety of ways but the message is the same: communication skills, the ability to engage in team working, and negotiation skills are essential in IT project management.

As for domain-specific knowledge, there are some differences in emphasis. While the project managers spoke about knowledge of different types of projects, grasping the general picture and understanding the project process, the students naturally referred to the project experience provided in the course, and mentioned project management and taking an integrative view of IS design as examples of knowledge and skills specific to information system project expertise. What the project managers brought up and the students did not was the perspective of economics and the law, which was probably due to the fact that economics and law are not taught in the DP course.

The third strong overlap between the different views concerns the development of the IT professionals' professional identity or self-knowledge. The project managers emphasized the importance of deliberation on the choice of a



prospective career as either a project manager or a technical specialist. Similarly, the students who had taken the project-based course often mentioned that the course had helped them to clarify their future career prospects.

A striking difference between the views of the three groups was that while the IS graduates considered innovative skills very important in their current jobs, neither the interviewed project managers nor the IS students paid attention to innovative learning or knowledge creation. References to motivational and adaptive skills or characteristics similarly appeared in the data from the IS graduates (although to a lesser extent), but did not feature at all among the project managers and project students.

Table 3. Correspondence between the Needs of Working Life (expressed by IS graduates and project managers) and the Outcomes of Project-Based Learning (expressed by students on the project-based course)

IS graduates: the most important skills needed at work [Tynjälä et al. 2006]	Project managers: the content and method of teaching future project managers	Students on the project-based course: experienced learning outcomes [Helle et al. 2007]
Innovative skills (e.g., creativity, innovativeness, developmental orientation, learning skills, problem-solving skills)		
Domain-specific knowledge and skills	Diversity of project types and clients Project-management skills: planning the whole project, critical work tasks in projects, economics, and the law	Domain-specific skills and knowledge Holistic managerial competence (incl. project management + an integrative view of IS design)
Social skills (e.g., communication skills, teamwork skills, negotiation skills, representation skills, people skills)	Inter-personal competences: team work, team building Psychological issues Communication skills	Client-related learning Communication with different people
(Minor emphasis): Motivational characteristics (e.g., commitment, motivation, goal setting, aspiration)		
(Minor emphasis): adaptive characteristics (e.g., adaptation to work pressures)		
	Self-knowledge	Professional identity: the strengthening of the professional self-concept and the clarification of career prospects

In summary, our comparative analysis indicates a strong overlap between the competence needs identified in working life and the self-reported learning outcomes of students on the project-based course. In particular, this is evident in domain-specific skills and knowledge related to project management, and in generic working-life skills, especially with regard to communication and interacting with other people.

VI. DISCUSSION

In our study, we considered the potential of project-based learning for meeting the challenge of educating IT professionals who are well prepared to act as project managers. We first collected data about working-life requirements from two groups we thought could best give us an insight into the work of IT professionals and project managers: 1) information systems graduates with several years of work experience and 2) IT project managers with several years of experience. In the second phase of the study we compared these groups' views with the learning outcomes of the students who had just completed a project-based course in information systems design. The students reported that during the course they had acquired domain-specific knowledge, project-management skills, and generic working-life skills in areas such as communication and teamwork. These are exactly the same skills that the project managers suggested were the most important things to be taught to students. Similarly, the IS graduates emphasized the importance of these skills and knowledge. These findings are in accordance with a recommendation put forward by Abraham et al. [2006]: IS programs should provide business-context-driven education to enable



students to acquire business and client-facing skills. We can thus conclude that the project-based course achieved its aims and could be seen as a working solution in the education of IT professionals.

Despite the general correspondence between the learning outcomes of the project-based course and the views of the professionals, there was also one striking difference: although the information systems graduates considered innovative skills essential in their work, neither the project managers nor the students mentioned innovativeness as a learning outcome or as something that should be taught to students. This discrepancy may be attributable to the different question formats used and the contexts of the three respondent groups. The information systems graduates were asked about the competences they needed in their work, while the project managers were asked what and how students should be taught at the university. It is possible that the innovation perspective is something that does not easily come to mind in the context of teaching. Similarly, it may be that it is not recognizable as a learning outcome in a course lasting a few months. The different types of data analysis may also have had an effect: the information systems graduates' data was coded on the basis of a theory-driven, ready-made classification, while the other two sets were coded according to data-driven methodology. It should also be noted that the analyses of the three data sets were conducted by different researchers independently of each other. In addition, the fact that not all information systems graduates work as project managers may have influenced the responses.

There may be some methodological limitations in our study. We used different methods in collecting the data from three groups (questionnaires for one group and interviews for the other two). Consequently, the sample sizes differed a lot. It is not possible in interview studies to collect data from a very big group, which may result in a biased sample. However, we think that the sample size of 15 in the project managers' data is enough to bring out the variation in work experience and in views of what the students should be taught. Another potential limitation is that the questions presented to the three groups were different: the information systems graduates were asked about the skills they needed at work, the project managers were asked to give their opinions on the contents and methods used in the education of IT professionals, and the students were asked about their learning outcomes in the project-based course. Different question formats undoubtedly produce different types of answers, which may or may not be comparable. The different question format was a necessity, however, because of the different positions and contexts of the three target groups. In addition, interviewing as a data-gathering method is problematic [see Fielding 1993 for details]. For example, the interviewee may understand the question in a way that was not intended by the interviewer. The fact that different researchers analyzed the three data sets has both pros and cons. One of the benefits is that the results were produced independently of each other, which makes any comparison more reliable. However, if the same researchers had carried out the analyses it would have resulted in more similar classifications because they probably would have used exactly the same terminology to describe similar categories. We produced categories that looked alike (in the different data sets) but were given different, albeit similar names. The classifications produced from our interview data make it possible to construct more detailed questionnaire items, which means that bigger samples of each target group can be used in future research.

As for the notion of *work-based* project learning itself, the study suggests that using authentic project commissions brings additional value to learning outcomes as compared to "canned" projects, or project exercises carried out in university settings. In our study, the students reported learning outcomes such as client-related learning, communicating with different people and strengthening professional identity—aspects that are probably less likely to emerge in classroom settings. In studies on traditional classroom instruction, students have reported learning outcomes that relate to the acquisition of theoretical knowledge, coupled with an almost total lack of experiences of learning more generic skills [e.g., Tynjälä 1999].

An obvious problem in organizing work-based projects is the fact that it takes a lot of resources, especially time and work, on the part of the instructors as well as the students. However, we see a trade-off in the potential of authentic experience to enhance both student motivation and learning outcomes, as compared to classroom study [see Helle et al. 2007b]. Our investigation was carried out in a European work and education context, which may raise questions about the generalizability of the findings to other regions, such as the American or Asian continents. We would take the view that in today's globalised world the requirements and skill structures of IT project managers are fairly similar all over the world. Nevertheless, in order to get comparable data we would welcome replicative studies in other regions.

VII. CONCLUSIONS

On the basis of our findings, we can conclude that project-based learning provides students with a learning environment that prepares them well for their future work. The students indicated that, in general, they were acquiring the skills and knowledge that IT professionals considered the most important in their work. These include both domain-specific knowledge (in this case about project management in particular, but also other forms of domain knowledge) and more generic working-life skills such as the ability to communicate and engage in teamwork. A

further important finding was that project-based learning appears to contribute to strengthening students' professional identity.

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ABOUT THE AUTHORS

Päivi Tynjälä, PhD, is a professor at the Institute for Educational Research of the University of Jyväskylä, Finland. Her research focuses on teaching, learning, and the development of expertise, and in particular, on the interface of education and working life. She has published widely both internationally and nationally, including edited books such as *Towards Integration of Work and Learning* (M-L Stenström & P. Tynjälä (Eds.) Springer, 2008) and *Higher Education and Working Life* (P. Tynjälä, J. Välimaa & G. Boulton-Lewis (Eds.), Elsevier, 2006). She is a member of the editorial board of two newly launched journals, namely, *Vocations and Learning: Studies in Vocational, and Professional Education*, and the *Journal of Writing Research*. She also acts as a member of the review panel of the *British Journal of Educational Technology*.

Maritta Pirhonen is an information systems Ph.D. candidate at University of Jyväskylä Department of Computer Science and Information Systems. She has more than 10 years of experience in using project-based learning in project management studies. Her research interests include ICT project management, especially the role of the project manager, and project-based learning in teaching project management.

Tero Vartiainen is adjunct professor at the Department of Computer Science and Information Systems, University of Jyväskylä, and Lecturer at the Turku School of Economics. His research and teaching activities focus on computer ethics and ICT project management. He has published articles in the *Communications of the Association for Information Systems* and the *Information Systems Journal*.

Laura Helle is currently working as senior research scientist at the Turku University Centre for Learning Research. She received her Ph.D in Education from the University of Turku. Her research interests include project-based learning, work and learning, higher education, medical education and computer-supported learning. She has published articles in *Higher Education* and the *British Journal of Educational Psychology* in addition to many articles in international books.

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CHALLENGES OF SUPERVISING STUDENT PROJECTS IN COLLABORATION WITH AUTHENTIC CLIENTS

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CHALLENGES OF SUPERVISING STUDENT PROJECTS IN COLLABORATION WITH AUTHENTIC CLIENTS

Maritta Pirhonen

*Department of Computer Science and Information Systems, University of Jyväskylä, Mattilanniemi 2, Jyväskylä, Finland
maritta.r.pirhonen@jyu.fi*

Keywords: Project-based learning, project management education, supervising

Abstract: There is a growing need for qualified project managers in the field of IS. The competencies and skills needed in project managers' work can not be learned only by reading the books. What kind of challenges does this bring to educators and educational systems, especially in universities? These challenges include such as, how to teach management and leadership skills and social competence needed in IS project management? Project-based learning (PBL) is an approach that enables students to learn management and leadership skills successfully in a working life driven project. PBL has proved to be an effective approach for learning skills and competencies demanded in project working. However, using PBL method alone does not guarantee learning result. In order to be successful, PBL method requires effective and competent supervision and guidance of students. This article focuses in supervising work-related project learning carried out in collaboration with authentic clients.

1 INTRODUCTION

In information systems development (ISD) work is increasingly organized as projects. Information systems (IS) projects are complex and difficult to manage because a software project can involve software development, maintenance or an enhancement to software (Schwalbe, 2004). Given the role of the IS project manager, interestingly, many argue that technical skills are not as important as non-technical abilities in the areas of teamwork and communications, and self-awareness (Faraj and Sambamurthy, 2006; El-Sabaa, 2001; Brewer, 2005; Gillard, 2005; Turner and Muller, 2006). Project work requires an ability to work as apart of a group, to plan the work, to make decisions as a group, and to communicate. The leadership skills of the project manager in IS projects are an important factor contributing to the success of the projects (Faraj and Sambamurthy, 2006; Bloom, 1996; Turner et al., 2005). Effective project manager must have good written and oral communication skills and adequate technical competence to manage the IS project. Pinto and Kharbanda (1996) emphasize the increased need for qualified project managers. Jurison (1999) state that project managers' broad experience with managerial and interpersonal skills is a basis for successful projects. Therefore, it is very difficult to find an experienced

and available project manager with right qualifications.

What kind of challenges does the growing need for the qualified project managers in IS field bring to the educational systems, especially universities? In response to challenge is to use project-based learning approach for learning skills needed in project work. Focusing on "real work" is a key means of motivating students to apply competency to an action. Pirhonen and Hämäläinen (2005) state that working life driven projects with close co-operation and interaction with industrial and business life may motivate the students to study - not just to take a degree. Moreover, project work makes it possible for students to apply theoretical knowledge to practice (Rebelsky and Flynt, 2000; Byrkett, 1987), which is important for the development of expertise (Bereiter and Scardamalia, 1993; Leinhardt et al., 1995; Tynjälä et al., 2003; Tynjälä, 2008a, 2008b). In terms of expertise, it is also worth mentioning that project studies may enable students to participate in the creation of new knowledge rather than confining themselves to the acquisition of existing knowledge.

However, using PBL method alone does not guarantee learning result. In order to be successful, PBL method requires effective and competent supervision and guidance of students.

This paper is organized as follows. First, pedagogical background for project-based learning is

reviewed. Then a particular model of this pedagogical approach based on studies in the field of information systems and the model of supervising are presented.

2 PEDAGOGICAL BACKGROUND OF PROJECT-BASED LEARNING

Project-based learning (PBL) refers to a theory and practice of utilizing real-world work assignments on time-limited projects to achieve mandated performance objectives and to facilitate individual and collective learning (Smith and Dods, 1997). A project-based learning method is a comprehensive approach to instruction. It is a learning model that involves students in problem-solving tasks and allows students to actively build and manage their own learning. PBL is linked to a theory of constructive learning that entails a shift in learning objectives. The underlying principle is the assumption that learning occurs during unstructured, complex activities (Helle et al., 2006).

Developing generic skills such as teamwork is an inseparable element in many models of project-based learning: teamwork is an inherent part of a project. Students involved in projects practice a vast range of skills in areas of project management, teamwork, and communications technology – and also in self assessment. Often collaboration skills are put into action by the collaborative nature of project management. In fact, recent studies have suggested that project work may have many educational and social benefits (Moses et al., 2000), such as the development of communication skills (Pigford, 1992), along with team-building and interpersonal skills (Roberts 2000; Ross and Ruhleder, 1993). Working process of a group is supported by supervisors who guide and assist students in independent learning and information retrieval. Teachers supervise the project process, and monitor the progress and a performance of students.

Project work in the field of information systems gives students the possibility to prepare for professional practice by producing plans, managing schedules, interviewing users and meeting project deadlines (e.g. Oliver and Dalbey, 1994). According to Hakkarainen et al. (2004), the knowledge-creation perspective is the most dynamic aspect of expertise, from both the individual and the societal perspective. For this reason it is important to support knowledge-creation activities during university studies (see also Helle et al., 2006).

3 A DESCRIPTION OF THE PROJECT-BASED COURSE

The main goal of the project course is to provide the students with opportunities to gain authentic practical experience of information systems projects (see Table 1 for a more specific description of what constitutes these skills are and how they are acquired).

Table 1: The learning goals and the implementation of the project course (Pirhonen & al. 2005, p. 35).

Learning objective	What?	How?
Group work skills	Goal-oriented and responsible action, recognizing stages of group development, spirit of the group, the own role in the group	Allocating the tasks equitable to the group for attaining the project objectives, weekly meetings with the supervisor, group meetings, discussions, peer reviews
Communication skills	Negotiation techniques, meeting practices, ability as a public performer, speech and written communication	Group meetings, meetings with client, supervisors, and project managers, steering group meetings, seminars, presentations, agendas, memos, minutes, e-mail
Project work skills	Project management, following through the project	Project plan, phase plans and reports, weekly plans and reports, inspection meetings, steering group meetings, acting as a project manager, lectures given by experts, theme seminars
Expert in the technical content of project	The knowledge of the project content	Acquaint oneself with the project scope, identifying the training needs, school oneself, the planned use of recourses of the client and the support group

The learning goal is to provide a comprehensive and realistic view of information systems experts' work in both project management and implementation of the task. Further objectives include familiarizing the students with the tools and methods of the project domain, acquisition of project management

skills, leadership and group work skills, communication skills, and technical competence.

3.1 Learning environment

The learning environment is maintained in coordination with three parties – the student group, the university, and the client organization (Figure 1).

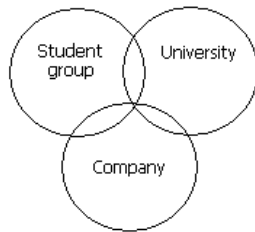


Figure 1: The actors in the learning environment.

A written cooperation contract between the three parties is drawn up before the project starts. It covers the subject matter (a description of the project objectives), the obligations and rights of the contracting parties, copyrights, guarantees and maintenance, confidentiality and the concealment of confidential information, payments and the payment schedule.

The project course is carried out between September and March (26 weeks). The course starts with lectures and orientation exercises for the students. The students form their groups of four to five members before the task-exhibition session at which the client representatives present the project assignments. After this session the student groups negotiate the distribution of the project tasks. During the course each student is expected to use 300 hours for implementing the project task and 100 hours for demonstrating project management and project work skills, including group leading, group work, and communication. A record of the working hours divided to the tasks is kept. The groups plan their work, complete the scheduled tasks assigned, and produce deliverables. Each student is expected to take the role of project manager and project secretary. These roles rotate every month and therefore each member of the project group works in both roles once. In total, a five-student group uses 1,500 hours in planning and implementing the client project. The collaboration ends with a steering group meeting at which the results of the student project are accepted.

3.2 Project assignments

The client typically represents a firm such as a software house or the IT department of an industrial organization. The tasks range from extreme coding projects to developmental projects and research. They are typically ill-defined and therefore there may be a need to clarify the task as the project proceeds. The teachers have responsibility for procurement of project assignments. They contact organizations and negotiate for possible project subject. In co-ordination with the potential clients, feasibility of the overall project concept is developed and assessed. In the beginning of the course the assignments are introduced to the students by the clients.

3.3 Project organization

The project organization comprises a group of between five students, supervisors, and client representatives (see Figure 2).

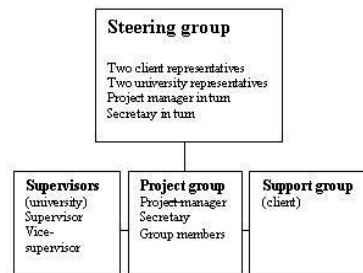


Figure 2: The organization of the project.

The steering group is selected during the initial stage and consists of representatives of the client organization, the university (supervisors) and the project team (the project manager and secretary in turn). It represents the highest authority in terms of decision-making, and decides on matters concerning the plans and issues related to the redefinition of the project content. One of the client representatives chairs the group meetings and the project-team manager has the role of a presenting official. Experts or consultants may also be invited to the steering-group meetings. The support group includes the network set up by the client, which provides the project group with content-related professional help when needed.

3.4 Project group

The project group consists of four to five students. The role of the project manager and the secretary rotates every month so that each member of the project group takes both roles once. The project manager is responsible for the following:

- coordination and communication with the client
- maintaining the project plan
- present the proposal to the steering group

The project secretary is responsible for keeping a record of meetings and writing memos and minutes. The project group carries out the project tasks within the limits of resources available and every student is responsibly for the quality of his/her work. Students are expected to review each other's work to give feedback.

After the group members have committed themselves to the task from those offered by the organizations of business and industry they get acquainted with the client organizations by visiting the client company. They create different forms of communication channels, such as electronic mail, phone, and personal contacts. After familiarizing themselves with the project scope and tasks involved, the project manager formulates the preliminary project plan in co-ordination with the group and the client. Since the project plan is reviewed by the client and the supervisors the revised project plan is approved by the steering group. The steering group has a meeting an average of five times during the project.

3.5 Assessment

The student group is assessed twice during the six-month period of the project. The first one takes place in the middle of December after three months work. The second assessment is carried out at the end of the project in April. The content of the assessment is grouped and structured around the themes covering issues to the course's objectives and critical to the effective project management. The course grade for individual student is calculated on the basis of the following assessment framework:

- planning (25%)
- communication and co-operation (20%)
- group work (25%)
- attitude (10%)
- outcome (20%)

The assessment process is organized so that both the teams and the supervisor write up an assessment report using the assessment framework. The assessment is based on the perceptions of the team work and documentation of the project process. The assessment of the project outcomes is made by

the client. After the written assessments are delivered, both supervisors and the team discuss and reflect the project in order to find out the causes of the success or the failure of the project. The grading of the course is mainly based on the debates that emerged in the discussion about written assessment. If needed, both supervisors and students have the right to suggest an individual grade for the student differentiating from the one given to the group. If these personal grades are given, they are based on a unanimous decision from all parties participating to the grading process.

4 SUPERVISING

Effective and competent supervision and guidance of students is a vital part of a project-based learning method; PBL method alone does not guarantee learning result. Especially in the early stages of the project, the role of the supervisor is vital in supporting communication and cooperation with the client. The experiences of supervisors have shown that the start-up phase needs to be conducted in a systematic way if it is to contribute positively to the project work.

During the project the students are supervised both by university teachers and by client representatives. The idea is that technical guidance should come from the client whenever possible, because they have the knowledge of the specific technological requirements. University provides more generic guidance concerning the project work. Supervisors have responsibility for the fulfilment of the academic learning objectives (see Table 1) only, not for project results to the client or for guiding the technical content of project. Supervisors guide the students in finding the essential aspects in order to carry out the project successfully. Decision-making is left to the group, although the supervisor may provide a timeline for the process. The supervisor takes also part in the meetings with the client. After the meeting the group and the supervisor analyze the meetings together.

Each project group have two supervisors from the university from which one acts as a vice supervisor. The supervisors are the facilitators and/or coaches who promote the collaboration and provide support and guidance. Supervisors also have an important role in promoting students' self assessment on their work. Their obligation is to provide an environment for the group where the student can ask questions when needed and to direct students to use actively instruction and expert recourses available. Supervisors support students' personal growth and development as well as guide processes of groups.

In order to support the development of reflective evaluation of the students, the groups are asked to formulate plans, track progress, construct and test alternative solutions and evaluate their hypothetical consequences. Students keep a learning diary in weekly basis, which contains reflection on their work and learning process. The project manager in turn writes up the weekly reports and plans as well as learning diaries. All documents are stored in the digital learning environment (Optima). This enables supervisors and group members becoming acquainted with the documents before the guiding meeting. The meeting between the supervisor and the group takes place weekly. The main objective of the meetings is to critically evaluate working and learning of the students. During the meetings, the weekly project reports and project plans are discussed. The project manager and team members report on the state of the project, which is compared with the documented expectations in the project plan. Issues that may possible cause problems during the project are discussed as well. The project secretary writes memos of meetings, which are also stored in Optima. Memos are checked in the next meeting. Between the meetings supervising is arranged mainly by e-mail.

5 CONCLUSIONS

The challenge of the higher education institutions is to provide opportunities for students to apply and develop their knowledge and competencies needed in the world of work. In the field of Information Systems it is essential to learn skills of project management. Project-based learning approach is process orientated and the students have responsibilities for managing the project (timeline, quality, decision making etc.) and group work.

However, there are some barriers that will prevent educational institutions from applying PBL. Setting up a market-driven project learning course may involve some difficulties.

Project based learning method alone does not guarantee good learning result. Effective and competent supervision and guidance of students is a vital part of a project-based learning method. In practise, it is difficult to find experienced teachers with right qualifications. This may be caused by resistance among teaching staff because teachers are not prepared and experienced enough to handle open and complex learning situations. Good supervisors of the working life driven projects should have multitude skills. They need to have understanding of learning processes alongside a project task. Their task is to provide an open and convenient learning environ-

ment for the students. Supervisors should also promote collaboration, provide support and guidance, and design a grading procedure focusing on the learning process alongside the evaluation of the project work. In addition, a challenge from teachers' point of view is the procurement of project assignments. Teachers need to have wide social network with the representatives in working life in order to find appropriate project tasks.

Moreover, the learning project designed for business purposes may cause moral conflicts between the actors (Vartiainen, 2007). In some cases, the main objective of the client organisation is to have a complete system, whereas the most important goal from the students' point of view is the acquisition of knowledge and skills for working life.

After all, learning results from the courses using PBL are comprehensive and transferrable to the world of work. However, we need further studies on how to train and motivate teachers to act as supervisors. Is PBL a solution for this issue?

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III

LEARNING SOFT SKILLS IN PROJECT MANAGEMENT COURSE: STUDENTS' PERCEPTIONS

by

Maritta Pirhonen, 2010

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Learning Soft Skills in Project Management Course: Students' Perceptions

Maritta Pirhonen

University of Jyväskylä, Dept. of Computer Science and Information Systems, Finland

ABSTRACT

There is a growing need for qualified project managers in the field of information systems (IS). Competence and skills of the project manager are critical to project success. The soft skills, often referred to as human or people skills, needed in project managers' work cannot be learned by studying them in a book or a lecture hall; one learns them by practice, often under the watchful eye of a competent supervisor. How to teach soft skills needed in IS project management is a challenge to educators and educational systems. Project-based learning (PBL) is an approach that enables students to learn these skills successfully in a working life driven project. But what are the students' own perceptions about their soft skills levels in the beginning and end of the Project Management Course (PMC) designed around PBL principles? In this paper we describe project management course and explore how students perceived their soft skills development during the course. In this paper we present results of students' self assessments about how their soft skills changed during PMC. Results show that students found their skills in communication, team work, and personal development significantly improved during the PMC.

Keywords: IS project management education, soft skills, project-based learning, project manager

INTRODUCTION

As organizations increasingly use projects to achieve business objectives and current number of IS project grows rapidly, there is a growing need for qualified project managers. IS projects can be distinguished from other types of projects (e.g. building a bridge) with special characteristics that include complexity, conformity, changeability, and invisibility (Jurison 1999; Schwalbe 2004). In a construction project, it is relatively easy to separate building a fence and altering a floor plan, but in IS projects the elements affect each other, also existing information systems (Dekkers & Forselius 2007). The difficulties in IS project management with constantly changing conditions, technology, resources, requirements, and schedules, cause failure for many IS projects (Murch 2001). Given the role of the IS project manager, many argue that technical skills are not as important as non-technical abilities in the areas of teamwork and communications, and self-awareness (Faraj & Sambamurthy 2006; Thite 1999; El-Sabaa 2001; Brewer 2005; Gillard 2005; Turner & Muller 2006). IS projects do not generally fail because of lack of adequate technology; key reasons for project failure include ineffective leadership, human factors have not been enough addressed, and lack of the support of the senior management (Gottschalk &

Karlsson, 2005; Czurchy & Yasin 2003). In addition the scope of the project is perhaps unclear, the technology and people in project organization may change during the project etc.

There is a considerable volume of literature dealing with soft skills (Muzio et al. 2007; Bloom, 1996; Turner et al., 2005; Thite, 1999, Faraj & Sambamurthy, 2006; Kirsch, 2000). Soft skills often referred to as human or people skills; tend to fall into following categories: teamwork, self-regulation, communication, leadership, organizational, interpersonal, and delegation.

The project manager's competence, skills, and attributes are critical to project success (Crawford, 2000). She is a key person in accomplishing project success and soft skills are needed to be taken into account in successful project management (Bloom 1996; Kezsbom et al. 1989, 181; Nicholas 1994, 189; Verner et al. 1999; Hyväri 2006; Lethbridge 2000; Denning & Dunham 2001; Ruuska & Vartiainen 2004; Sumner et al. 2006). Because IS projects support every possible industry and business function, project management requires not only skills in information technology but also understanding of customers' field. Therefore soft skills are becoming increasingly important to all areas of IS (Young & Lee 1997; Lee et al. 1995) and have been raised as one of significant project success factors (Jugdev & Muller 2005; Kirsch 2000; Pitkänen 2009). Many managers responsible for IS projects are either untrained or poorly trained for their work (Maqsood & Javed 2007). More often than not they are trained in hard skills, often described as a science and comprising processes, tools and techniques applied to projects. Since working successfully in teams is a requirement in the field of IS, project manager's work requires, amongst others, an ability to work as a part of a group, to plan the work, to make decisions as a group, and to communicate (Tynjälä et al. 2009).

The connection of the project manager's soft skill competence to project success together with the growing need for qualified project managers in the field of IS needs to pay attention to planning project management courses in educational organizations (Pant & Baroudi 2008). According to Du et al. (2004), IS programs are giving less emphasis to soft skills such as human resource and project communication management.

In this paper we describe project management course based on project-based learning principles and explore how students perceived their soft skills development during the course. Following this introduction, we introduce the basic idea of project-based learning. Next, the course carried out in collaboration with authentic clients is briefly described. Then, the research design is presented and the results are given and discussed.

PROJECT-BASED LEARNING

Project-based learning refers to a theory and practice of utilizing real-world work assignments on time-limited projects to achieve mandated performance objectives and to facilitate individual and collective learning (Smith & Dodds 1997). The underlying principle is the assumption that learning occurs during unstructured, complex activities (Barron & al. 1998; Helle et al. 2006). Developing skills such as teamwork, communication, and self assessment is an inseparable element in many models of project-based learning. PBL can take different forms. In some courses the project work is carried out with a real-life client (Green, 2003; Watson & Huber, 2000; Brown et al., 1989). Focusing on "real work" is a key means of motivating students to apply competency to an action (Blumenfeld et al. 1991; Chen 2006, Helle et al. 2007). Pirhonen & Hämäläinen (2005) state that working life driven projects with close co-operation and interaction with industrial and business life may motivate the students to study - not just to take a degree. Real world projects integrate various technical and soft skills in order to solve real

business problems. Moreover, project work gives students the possibility to prepare for a role of a project manager by producing plans, managing schedules, interviewing users and meeting deadlines (e.g., Oliver & Dalbey, 1994).

PROJECT MANAGEMENT COURSE

The course belongs to the studies towards Master of Science of Economics degrees in the field of ICT at the University of Jyväskylä. The main goal of the project course is to provide the students with opportunities to gain authentic practical experience of information systems projects. Further objectives include familiarizing the students with the tools and methods of the project domain, acquisition of project management skills, leadership and group work skills, communication skills, and technical competence (see Table 1). The implementation of the PMC bases on project-based learning (PBL) approach.

Table 1. The learning objectives and the implementation of the Project Management Course

Learning objective	What?	How?
Team work skills	Goal-oriented and responsible action, recognizing stages of group development, spirit of the group, the own role in the group	Allocating the tasks equitable to the group for attaining the project objectives, weekly meetings with the supervisor, group meetings, discussions, peer reviews
Communication skills	Negotiation techniques, meeting practices, ability as a public performer, speech and written communication	Group meetings, meetings with client, supervisors, and project managers, steering group meetings, seminars, presentations, agendas, memos, minutes, e-mail
Project management skills	Project management, following through the project	Project plan, phase plans and reports, weekly plans and reports, inspection (review) meetings, steering group meetings, acting as a project manager and secretary, lectures given by experts, theme seminars
Expert in the technical content of project	The knowledge of the project content	Acquaint oneself with the project scope, identifying the training needs, school oneself, the planned use of recourses of the client and the support group

Learning environment

The learning environment is maintained in co-ordination with three parties – the student group, the university, and the client organization. A written cooperation contract between the three parties is drawn up before the project starts. It covers the subject matter (description of the project objectives), the obligations and rights of the contracting parties, copyrights, guarantees and maintenance, confidentiality and the concealment of confidential information, payments and the payment schedule.

Project assignment

The client typically represents a firm such as a software house or the IT department of an industrial organization. The tasks range from extreme coding projects to developmental projects and research. They are typically ill-defined and therefore there may be a need to clarify the task as the project proceeds. The teachers have responsibility for procurement of project assignments.

Project group

The group consists of four to five students. The role of the project manager and the secretary rotates every month so that each member of the project group takes both roles once. The group carries out the project tasks within the limits of resources available (400 hours/student) and every student is responsible for the quality of his/her work. Students are expected to review each other's work and to give feedback.

Supervising

The students are supervised both by university teachers and by client representatives. In order to support the development of reflective evaluation of the students, the students formulate plans, track progress, construct and test alternative solutions and evaluate their hypothetical consequences. They keep a learning diary in weekly basis, which contains reflection on their work and learning process. The meeting between the supervisor and the group takes place weekly. The main objective of the meetings is to critically evaluate working and learning of the students. The project manager reports on the state of the project, which is compared with the documented expectations in the project plan. Issues that may possible cause problems during the project are discussed as well.

Assessment

The student group is assessed twice during the six-month period of the project. The first one takes place in the middle of December after two months work. The second assessment is carried out at the end of the project in April. The content of the assessment is grouped and structured around the themes covering issues to the course's objectives and critical to the effective project management. The course grade for the group is calculated on the basis of the following assessment framework: project management, team work, communication, professional way of working, and outcome. The assessment process is organized so that both the teams and the supervisor write up an assessment report using the assessment framework. The assessment is based on the perceptions of the team work and documentation of the project process. The assessment of the project outcomes is made by the client. After the written assessments are delivered, both supervisors and the team discuss and reflect the project in order to find out the causes of the success or the failure of the project. The grading of the course is mainly based on the debates that emerged in the discussion about written assessment.

RESEARCH QUESTIONS AND HYPOTHESIS

The goal of this study is to answer two questions: (1) Does the course based on PBL approach support learning soft skills needed in project manager's work? (2) What was the student's self-assessment of their soft skills level before and after the course? In this work, we use following categories when defining the soft skills: communication, teamwork, and personal development. The factors related to the categories are shown in Table 2. These factors are derived from learning goals of PMC.

Table 2. Soft skills factors related to communication, teamwork, and personal development

Category	Factor	Description
Communication	ability as a public performer	paying attention to audience, loud and clear speaking
	written communication	writing clearly different kind of plans, reports, minutes etc.
	meeting techniques	the pre-meeting preparation, acting in formal meetings, post-meeting activities
	negotiation	resolving disputes and conflicts via talks and discussions and refocus on the new common goal
	reporting	preparing informative reports for different purposes
	oral communication	informative and persuasive speaking
	e-mail communication	identifying situations where e-mail is a suitable communication channel, to know principle of e-mail writing
Teamwork	data acquisition methods	gathering relevant information from a wide range of sources
	dividing tasks equally among a team	discussing with team members before dividing tasks
	decision-making	making timely and well-considered decisions by applying knowledge in a given area
	doing given tasks	completing giving tasks on time
	creating a positive group spirit	creating open and honest atmosphere
	giving constructive feedback	giving feedback in the way it helps to achieve the common goal
	organizational skill	arranging and allocating work and recourses among a team so that plans may be successfully carried out
	motivation	having drive and energy to achieve results
	target-oriented action	keeping the focus in the mind when acting
	resource exploitation	using the recourse available gainfully for achieving a common goal
	problem-solving skills	recognizing and defining problems, invent and implement solutions, and tracking and evaluating results
	listening skills	listening attentively trying to understand, interpret, and evaluate what she hears
take others into consideration	being aware of, and taking account the needs and perceptions of others	
Personal development	receiving constructive feedback	inviting feedback and taking account of others' opinion
	self improvement	admitting her own mistakes and learn of them
	time management	planning, organizing, and controlling her own time

Based on assumption that learning occurs during unstructured, complex activities and developing soft skills such as teamwork, communication, and self assessment is an inseparable element in the course based on project-based learning we pose the following hypothesis:

H1: In the course based on PBL principles students learn skills as communication, teamwork and self assessment.

DATA COLLECTION AND ANALYSIS

The students (six groups, female 7 and 23 male) attended the course between November 2007 and May 2008. The mean age of the students was 26.9, ages being between 22 and 51. Most of

the students (17) were studied for more than 4 years before starting the course. Twenty students had more than 200 credit points (mean 220). All of them filled the given self-assessment questionnaire before and after the course. The questionnaires asked the students to use 5 point Likert-type scales ranging from 1 (vaguely familiar) to 5 (know in depth) to rate their current skills in communication, teamwork, and personal development. The related factors to these dimensions of the soft skills are shown in Table 2. The questionnaire used in present research also included questions about the three most important skills that project manager should possess and what are the three critical skills related to the project success. In addition, questions about project management skills (cost, quality, change, risk, planning, scope, and control) and the students' learning expectations (before the course) and learning results (after the course) were included. The comparison of student's self-assessed soft skills competence before and after course was analyzed by the nonparametric Wilcoxon signed rank test.

RESULTS

An overview of the results is presented in Table 3. As expected, the students' soft skills measured by their self-assessments improved compared to the state before the course. The results of the study indicated significant improvement ($p < 0.05$) in students' communication, teamwork, and personal development skills with the exception of two factors (creating a positive group spirit and motivation) in teamwork category.

Table 3. Means and p-values of soft skills factors

Communication	Mean before	Mean after	Difference	p
ability as a public performer	3.3333	3.9667	0.6334	.001
written communication	3.7000	4.3000	0.6000	.001
meeting techniques	3.0333	3.8333	0.8000	.000
negotiation	3.4000	3.8333	0.4333	.016
reporting	3.4000	4.2667	0.8667	.000
oral communication	3.8000	4.1667	0.3667	.008
e-mail communication	4.0667	4.3667	0.3000	.013
data acquisition methods	3.6667	4.1000	0.4333	.017
Teamwork				
dividing tasks equally among a team	3.7000	4.2667	0.5667	.000
decision-making	3.6000	4.2333	0.6333	.000
doing given tasks	4.0000	4.6333	0.6333	.000
creating a positive group spirit	3.9333	4.1667	0.2334	.209
giving constructive feedback	3.3333	3.8667	0.5334	.008
organizational skill	3.6667	4.2000	0.5333	.003
motivation	3.4333	3.6333	0.2000	.175
goal-oriented action	3.6667	4.3000	0.6333	.002
resource exploitation	3.4000	4.0333	0.6333	.002
problem-solving skills	3.6667	4.2000	0.5333	.003
listening skills	3.7333	4.3667	0.6334	.000
take others into consideration	3.9667	4.4000	0.4333	.007
Personal development				
self evaluation skills	3.5333	3.8000	0.2667	.046

receiving constructive feedback	3.5667	4.0333	0.4666	.002
self improvement	3.2333	3.9667	0.7334	.000
time management	3.0667	3.8333	0.7666	.001

In communication category all skills were significantly improved compared to the state before the course (Wilcoxon signed rank test $p < 0.05$, see Table 3.) The most significant difference is seen in an ability as a public performer, written communication, meeting techniques, and reporting ($p < 0.001$). Figure 1 shows the differences of means in communication category before and after the course.

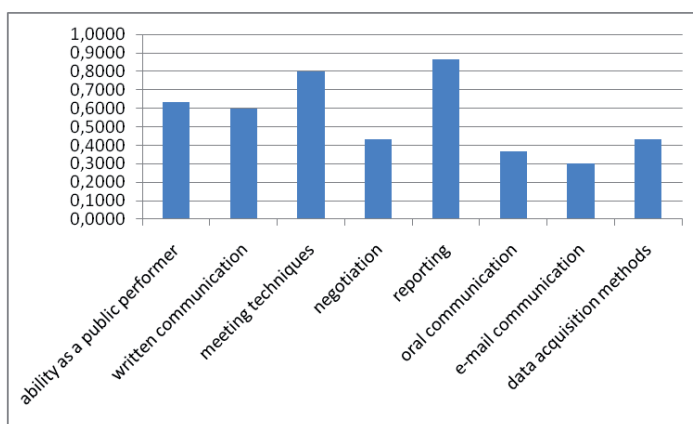


Figure 1. The Difference of Means of Communications factors

In teamwork category all skills except for creating a positive group spirit and motivation were significantly improved compared to the state before the course (Wilcoxon signed rank test $p < 0.05$, see Table 3.) The most significant difference can be seen in dividing tasks equally among a team, decision-making, doing given tasks, and listening skills ($p < 0.001$).

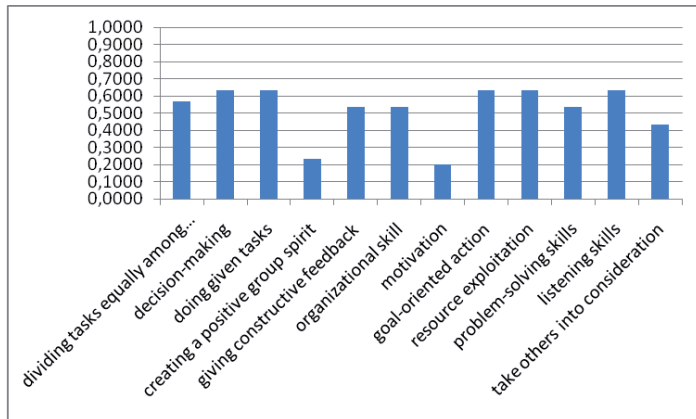


Figure 2. The Differences of Means of Teamwork Factors

In personal development category all skills were significantly improved compared to the state before the course (Wilcoxon signed rank test $p < 0.05$, see Table 3.) The most significant difference can be seen in time management and self improvement ($p < 0.001$). The highest difference of means is seeing in factors of self improvement and time management (see Fig. 3).

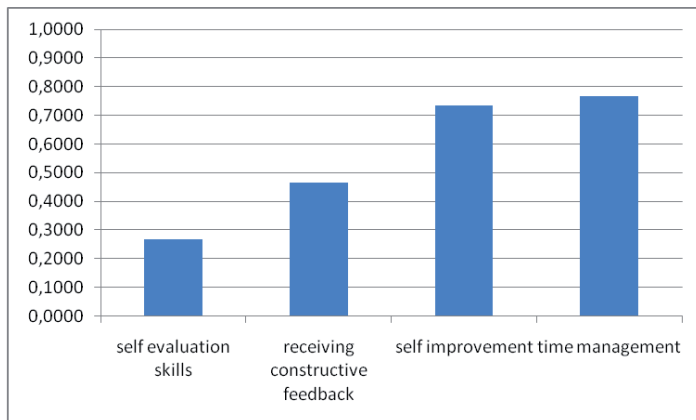


Figure 3. The Differences of Means of Personal Development Factors

According to the students assessments before the course they had most lack of skills in meeting techniques (mean 3.0333), time management (mean 3.0667), ability as a public performer and giving constructive feedback (mean 3.3333) compared to another skills. This

might tell us that students did not have earlier experience or courses relating on these skills. The development in all these skills shows significant difference according Wilcoxon signed rank test ($p < 0.001$).

DISCUSSION AND CONCLUSION

Soft skills of the project manager are critical to project success. The soft skills needed in project managers' work are learnt by practice, not by reading books. Teaching soft skills is a challenge to educators and educational systems, especially in universities, where studies often base on lectures, reading books, and exams. In the Project Management Course based on Project-based Learning principles, the students have responsibilities for managing the project (timeline, quality, decision making etc.) and team work. Based on our findings; we see PBL to be an effective approach for learning soft skills required in a project manager's work. According to the students' self-assessment of their skills in communication, teamwork, and personal development improved during the PMC. The most significant change is seen especially in ability as a public performer, written communication, meeting techniques, and reporting. This is not surprising because every student practices these skills in different kind of meetings during the course (cf. Table 1).

The results support our hypothesis: In the course based on PBL principles students learn skills as communication, teamwork and self assessment. Since working successfully in teams is a requirement in the IT industry, we need education which contributes to the development of student's soft skills. The development of project manager's soft skills is a life-long process but courses based on real world projects assignments give a good opportunity to practice vital skills in successful project management.

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IV

REPLACEMENT OF PROJECT MANAGER DURING IT PROJECTS - A RESEARCH AGENDA

by

Tero Vartiainen, Maritta Pirhonen, Heli Aramo-Immonen & Kirsi Liikamaa,
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Tero Vartiainen

Department of Information Processing Science, University of Oulu, Oulu, Finland., tero.vartiainen@oulu.fi

Maritta Pirhonen

Department of Computer Science and Information Systems, University of Jyväskylä, Jyväskylä, Finland., maritta.pirhonen@jyu.fi

Heli Aramo-Immonen

Department of Industrial Management and Engineering, Tampere University of Technology, Pori, Finland., heli.aramo-immonen@tut.fi

Kirsi Liikamaa

School of Economics, University of Turku, Pori, Finland., kirsi.liikamaa@tse.fi

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Replacement of Project Manager during IT Projects – A Research Agenda

Tero Vartiainen
University of Oulu
tero.vartiainen@oulu.fi

Maritta Pirhonen
University of Jyväskylä
maritta.pirhonen@jyu.fi

Heli Aramo-Immonen
Tampere University of Technology
heli.aramo-immonen@tut.fi

Kirsi Liikamaa
University of Turku
kirsi.liikamaa@tse.fi

ABSTRACT

Replacing the project manager (RPM) during IT project is a known phenomenon, but surprisingly, few studies have investigated the issue. To improve understanding of the situation in the IT field, we propose a research agenda that aims to provide IT professionals the means to sustainably manage RPM in IT projects. The research agenda is structured in line with the goals of theories in Gregor's taxonomy of IS theories, and with the agenda, substantive theories on RPM in IT projects are to be developed. There are four major research questions: i) How is RPM in IT projects experienced? ii) When RPM occurs in IT projects, what happens and why, and how does it affect stakeholders? iii) How can RPM in IT projects be predicted? iv) How to manage RPM in IT projects? The research agenda is discussed and evaluated.

Keywords

IT projects, project manager, project management, turnover, IS theory

INTRODUCTION

Replacing a project manager (RPM) during IT project means that the project manager is transferred from the task of managing the project to managing another project, the project manager is expelled from the project, or he or she voluntarily leaves organization, for example. Our discussions with IT professionals have shown that RPM is a known phenomenon and happens occasionally, but there are no clear means for addressing the situation. Although turnover of IT professionals has been studied, for example, Moore (2000) studied how work exhaustion causes turnover; Dinger, Thatcher, Stepina and Craig (2011) and Ahuja, Chudoda, Kacmar, McKnight and George (2007) studied how conflict between work and family duties causes turnover, very few studies have examined RPM in IT projects (e.g., Vartiainen and Pirhonen, 2007). We argue that the fundamental goal of research on RPM in IT projects should be developing theories that provide IT professionals and managers understanding, methods, instruments, organizational structures, and principles to handle RPM situations sustainably and successfully. We also argue that RPM in IT projects should be considered from the viewpoint of whether it should be avoided or whether it is, in some circumstances, a necessary situation. In addition, the positive viewpoint of RPM should not be forgotten as any challenging situation in any organization could also be considered a learning opportunity (e.g., Engeström, 1987).

For this aim, we adopt a theory-development approach and suggest a research agenda for RPM in IT projects to develop substantive theories on the issue. A substantive theory is a theory developed for a specific area of inquiry (Gregor, 2006), and in this case we propose that for RPM in IT projects specific theories should be developed. We divide the research agenda into developing theories that describe, explain, predict, and prescribe RPM in IT projects. This division is based on Gregor's (2006) division of the goals of theories in IS. We argue that Gregor's division is suitable for designing future research on RPM in IT projects as it provides a holistic way to consider RPM in IT projects from developing an understanding to managing RPM in practice.

This article is organized as follows. After this introduction, we briefly review the related literature on RPM in IT projects, and we show that a research agenda is needed. Then, we introduce Gregor's taxonomy of theories of IS, which is used as a framework to construct the research agenda described in the following section. Finally, the research agenda and its potential are discussed.

RELATED LITERATURE

Research on staff turnover in general has been a topic of considerable research in areas such as sociology, organizational behavior, finance, economics, and accounting, as well as in the IT field, but only a rather small number have addressed the topic of management turnover - variously termed replacement, displacement, succession, dismissal or changes. Many of these studies (Murphy and Zimmerman, 1993; Coughlan and Schmidt, 1985; Leker and Salomo, 2000; Shen and Cannella, 2002; Puffer and Weintrop, 1991; Ton and Huckman, 2008; Lausten, 2002; Barron, Chulkov and Waddell, 2011) have shown that organizational performance is an important factor in top management turnover. The causes of IT professional turnover have been studied since the 1980s (Baroudi, 1985; Dittrich, Couger and Zawacki, 1985). Moore (2000) found that IT professionals' exhaustion causes turnover in organizations: The strongest contributors to turnover intention were perceived fairness of rewards, work exhaustion, organizational tenure, and perceived workload. In addition, other factors affected willingness to leave: a high level of stress, role ambiguity and role conflict create role stressors that impact turnover decisions (e.g., Baroudi, 1985; Guimaraes and Igbaria, 1992; Igbaria and Siegel, 1992; Thatcher, Stepina and Boyle, 2002; Jiang and Klein, 2002; McKnight, Phillips and Hardgrave, 2009). According to Longenecker and Scazzero (2003) among the factors causing IT managers to leave their employer are shortage of resources and staff needed to get the job done, unrealistic performance demands, negative organizational culture, a better job opportunity or salary, and lack of cooperation, for example.

Changes in project management are common. Still few studies have examined replacement in the project management context (e.g., Abdel-Hamid, 1992; Parker and Skitmore, 2005). Sauer, Gemino and Reich (2007) found that in every two projects there was a change in project manager (N=412 IT projects) and the changes had strongly adverse effects to project. Parker and Skitmore's (2005) study showed that turnover disrupts and negatively affects the performance of the project team and the project, and conceivably negates the competitive advantage of organizations concerned. Turnover occurs chiefly during the execution phase of the project life cycle, and the main causes of turnover are related to career and personal development and dissatisfaction with the organizational culture and project management role (Parker and Skitmore, 2005). According to Abdel-Hamid's (1992) study, managerial turnover can lead to a considerable shift in cost or schedule trade-off choices, affecting staff allocations and eventually project performance in terms of cost and duration. With respect to IT management turnover, Longenecker and Scazzero's (2003) study showed that the most obvious and significant problem caused by turnover was its negative impact on achieving performance goals. In addition, turnover causes communication breakdowns, a loss of focus and direction, and an increase in unresolved problems. The loss of key IT managers can create morale and motivational problems among staff, an increase in workload and stress among staff, and loss of teamwork and cooperation, but turnover may also have positive effects (Dalton and Todor, 1979).

Three studies in IS directly concerned RPM. Based on interviews, Vartiainen and Pirhonen (2007) determined two classes of reasons for RPM: i) Replacing the project manager to rescue a troubled project and ii) replacing the project manager as part of the process. In addition, they defined what kind of knowledge should be transferred from the preceding project manager to the succeeding manager (Pirhonen and Vartiainen, 2007). Vartiainen, Aramo-Immonen, Jussila, Pirhonen and Liikamaa (2011) further showed that activity theory is a usable framework for considering RPM. These studies, however, were restricted to the project level, and the whole project portfolio viewpoint was missing, that is, how in an organization with multiple projects RPM is considered and how it should be dealt with. In Vartiainen, Aramo-Immonen and Liikamaa's (2010) study, activity theory was used as a lens for analyzing the underlying reasons for RPM in IT projects. In their study, the project portfolio viewpoint was considered, and they found six reasons for RPM: i) Project manager's personal values, needs, capabilities, and life situations become inconsistent with the project, ii) collaboration between the project manager and the project organization becomes difficult, iii) the project manager has not achieved the defined objectives, iv) the need to re-plan the whole project leads to RPM, v) the client seeks an additional benefit by demanding RPM, and vi) the project manager is wanted for another project inside the company.

Although some studies have investigated RPM in IT projects, these studies are still in the first steps in developing in-depth understanding how to manage RPM. Therefore, we need a systematic way to define future research on RPM in IT projects. For this purpose, we use the description of the goals of theories in IS by Gregor (2006).

THE GOALS OF THEORIES IN GREGOR'S TAXONOMY

March and Smith (1995) first introduced a typology of methods for IT named "design and natural science research on information technology". In this study, methodology from other scientific domains was applied to IT research. More recently, Gregor (2006) introduced her proposal for theory building in IS. In her study, five interrelated theories were distinguished: theory for analyzing, theory for explaining, theory for predicting, theory for explaining and predicting, and theory for design and action. The phenomenon of RPM contains knowledge of human behavior in connection with the social-historical system in which RPM occurs. Therefore, an analysis and description of RPM, an explanation for RPM and prediction (causality

between contradictions and action, for example), and a design of action (for the management situation, for example) are needed. This being the case, we suggest, for guiding research on RPM in IT projects, the use of Gregor's (2006) classification of goals of theories in IS research (Table 1).

The goal of the theory	Description
Analysis and description	The theory provides a description of the phenomena. It may also analyze the interrelations of constructs, the degree of generalizability in constructs and relationships, and the boundaries within which relationships and observations hold. The theory does not extend beyond analysis and description.
Explanation	The theory provides an explanation of how, why, and when things happen. The theory provides explanations but does not aim to predict with any precision.
Prediction	The theory states what will happen in the future if certain preconditions hold.
Prescription	This is a special case of prediction in the way that theory provides a description of the method or structure (or both) for the construction of an artifact (akin to a recipe). If acted upon a recipe, an artifact of a certain type will come into being.

Table 1. The goals of IS theories (Gregor 2006)

Based on the goals of IS theories, we developed the following research agenda for RPM in IT projects. The development of the agenda was iterative in nature as there were different versions of research questions during the process. The research agenda is next introduced.

RESEARCH AGENDA FOR RPM IN IT PROJECTS

We propose four research questions the goals of which are based on Gregor's (2006) work. The research questions are as follows (see Table 2 for a summary).

The research questions	RPM in IT projects specific theories
Research Question 1: How is RPM in IT projects experienced? (analysis and description)	Descriptions of the individual experience of RPM
Research Question 2: When RPM occurs in IT projects, what happens and why, and does it how it affect stakeholders? (explanation)	Descriptions of the paths leading to RPM in IT projects; Effects of RPM on IT projects
Research Question 3: How can RPM in IT projects be predicted? (prediction)	Models predicting RPM in IT projects
Research Question 4: How to manage RPM in IT projects? (prescription)	A process model for RPM in IT projects; Principles for developing organizational and project culture to take into account RPM in IT project in sustainable ways; Create principles and methods to develop a learning environment for project organization

Table 2. The research questions for RPM in IT projects and the RPM in IT projects specific theories

Research Question 1: How is RPM in IT projects experienced? (analysis and description)

We need analytic theories that describe or classify by summarizing the commonalities found in RPM in IT projects:

Descriptions of the individual experience of RPM in IT projects. Studies have shown that IT professionals' jobs are mentally demanding (e.g., see the study by Ahuja et al. 2007 on IT road warriors), and therefore, IT professionals may suffer from psychological consequences stemming from their jobs. IT projects are pressurized environments (e.g., Baskerville, Levine,

Ramesh, Pries-Heje and Slaughter, 2001; Longenecker and Scazzero, 2003), and work exhaustion is reported to affect turnover intentions (Moore 2008). Therefore, it is likely that RPM in IT projects might have psychological consequences for the parties involved with RPM occurrences such as the preceding project manager, the succeeding manager, team members, and the supervisor. Future studies should develop descriptions for how individuals taking part in RPM in IT projects experience the situation. The experiences should be studied to anticipate RPM before it occurs, experience ongoing RPM, and how RPM is considered afterwards in IT projects.

Research Question 2: When RPM occurs in IT projects, what happens and why, and how does it affect stakeholders? (explanation)

We need explanatory theories for RPM. These theories should explain how and why RPM occurs. With respect to the nature of explanatory theories, these theories may also answer the question when and where RPM occurs. These explanations should promote greater insights into the RPM phenomenon than analytic theories can offer. The following theories are needed:

Descriptions of the paths leading to RPM in IT projects. Two existing studies describe the reasons for RPM in IT projects (Vartiainen and Pirhonen, 2007; Vartiainen et al., 2011), but more studies taking the viewpoint of the entire RPM process are needed. The episodes before, during, and after RPM and why such episodes occur should be analyzed and described. As RPM relates to chronological developments of situations or processes (cf. project escalation, Keil, 1995; Keil, Mann and Rai, 2000), process theory viewpoint would be fruitful: Process theory makes it possible to identify antecedent conditions, encounters, episodes, and outcomes (Newman and Robey, 1992, Markus and Robey, 1988); that is, in the case of RPM it would be possible to identify paths leading to RPM. Descriptions of the paths would explain why RPM occurs. In addition, process theory makes it possible, by analyzing events, their paths, and their sequences, to identify patterns (Markus and Robey, 1988). With this kind of knowledge, we would understand the patterns with respect to the emergence of RPM in IT projects.

Effects of RPM in IT projects. Abdel-Hamid's (1992) results show that turnover in software development (cf. Parker and Skitmore, 2005) has negative consequences for projects as whole. In addition, Vartiainen and Pirhonen's (2007) results suggest that RPM in IT projects causes "chaos" in a project. This being the case, RPM may have serious consequences for stakeholders such as the client and the project team and its single members, for example. We argue that these effects should be studied. In addition, the effects of refraining from RPM - when in retrospective RPM should have been implemented—should be studied. The effects might be economical, psychological, and social in nature, for example. As an example, RPM causes the succeeding project manager to build relationships with individual team members who have to adjust to a new situation. This means that the project team confronts a change that has to be managed. Thus, knowledge on the effects of RPM on the team is needed, for example.

Research Question 3: How can RPM in IT projects be predicted? (prediction)

In order to prevent RPM and avoid or handle this situation we need predicting theories to recognize the predictor variables for RPM. These kinds of theories state what will happen in the future if certain preconditions hold. With respect to RPM in IT projects, the following theories would be beneficial:

Models predicting RPM in IT projects. According to variance theories, variables are identified and causally linked to outcomes (Ahmad, Lyytinen and Newman, 2011). As the prior studies on RPM in IT projects describe the reasons for RPM (Vartiainen and Pirhonen 2007; Vartiainen et al., 2010), we might be able to identify preconditions that affect the emergence of RPM in IT projects; that is, we might produce causal connections between conditions in IT projects and the emergence of RPM. A contradiction (in terms of activity theory) causing RPM was that the project manager's personal values, needs, capabilities, and life situations become inconsistent with the project (Vartiainen et al. 2010). This broad category includes the project manager's concerns of well-being at work, for example. Based on this finding, job satisfaction might be a variable that has a causal connection to RPM. Other variables should be identified, and their connections to the emergence of RPM should be studied. At least two studies might provide insights into identifying variables. First, Joseph, Kok-Yee, Koh and Soon (2007) defined a contextual model of turnover of IT professionals that constitutes of environmental-level, firm-level, and individual-level variables. At the individual level, there are job-related factors such as role behaviors and role stressors, for example. Second, Fredrickson, Hambrick and Baumrin (1988) defined a model of CEO dismissal that includes objective determinants, sociopolitical constructs, and performance dismissal link. Sociopolitical constructs relate to the board's expectations and the availability of alternative CEO candidates, for example.

Research Question 4: How to manage RPM in IT projects? (prescription)

We need prescriptive theories touching on the question how to manage RPM in an organization (theories for design and action). These theories should describe how the organization as a whole should consider RPM in their IT projects. These theories should provide key players such as the top-management and supervisors methods and principles for reacting to RPM

occurrences. In addition, the methods and principles should consider the development of the organizational and project culture to handle RPM as sustainably as possible. In addition, research might reveal how to avoid RPM altogether or how to minimize negative effects of RPM and even to benefit from it. The following prescriptive theories are needed:

A process model for RPM in IT projects. RPM is a challenge for balanced and harmonious project portfolio management as an RPM situation causes a turbulent situation for the project (cf. Vartiainen and Pirhonen, 2007). There is a need to define a prescriptive process model for RPM to aid all related parties in such a change situation. This process model should take into account experiences of individuals confronting RPM (cf. Research Question 1) as for project managers RPM may be a difficult situation. The process models should also take into account the different paths leading to the RPM situation (cf. Research Question 2) as the underlying reasons for RPM are diverse (Vartiainen et al., 2010). This might mean that the steps succeeding RPM may differ with respect to the underlying reasons for RPM possibly resulting in multiple process models. In any case, the process models should include instructions on how to transfer the critical knowledge from the preceding manager to the succeeding manager (see Pirhonen and Vartiainen, 2007) on knowledge transfer in RPM), for example.

Principles for developing organizational and project culture to take into account RPM in an IT project in sustainable ways. An organizational culture is the shared basic assumptions accepted and used by the organization (Schein, 1985). These assumptions and their application can be affected (Andersen, 2003), and we argue that there is a need to define principles that guide managers and staff in organizations to more sustainably take into account RPM in IT projects. Furthermore, according to activity theory, an activity system such as project, for example, is highly influenced by the dominant culture (e.g., Engeström, 1987). Therefore, these principles might consider how supervisors should act when anticipating or confronting RPM occurrence by supporting preceding and succeeding managers and the entire project group, and working for a more open and conversational atmosphere in the project, for example. When RPM is perceived as an unwanted situation, the principles should take into account how RPM could be avoided altogether by strengthening the confidential atmosphere inside the project (namely, the project culture), for example. Our discussions with supervisors revealed that there is a need for these kinds of principles as there are no clearly defined policies in organizations that take into account RPM in IT projects. These principles might be developed via action research or design science approaches that emphasize rigorous development of relevant practical issues.

Create principles and methods to develop an integrated learning environment for project organization. Learning should be integrated in everyday actions in projects (Aramo-Immonen and Porkka, 2009). The concepts of expansive learning and externalization and internalization of knowledge (Engeström, 2000; Nonaka, Reinmoeller and Senoo, 1998) may offer new insights for RPM. In the case of RPM, the organizational learning capability of the project team is vital. As an example, project teams are required to develop relationships with the successor project manager. Thus, the successor manager may have novel working methods, visions, and attitude (i.e., a different mental model). Furthermore, project portfolio managers (Levine, 2005) have to learn the affecting factors in allocating project managers to projects in new situations. This means that RPM leads to a change management situation in which individual and collective learning ability is necessary (cf. the effects of turnover of IT management in Longenecker and Scazzero, 2003). Development of these abilities has to be supported by a learning environment to gain a balanced and harmonious project portfolio.

DISCUSSION

In this study, we proposed a research agenda with four research questions to develop substantive theories on RPM in IT projects (Table 2). The theory development is based on the goals of theories, analysis and description, explanation, prediction, and prescription (Gregor, 2006). The RPM theories aim to develop the professional practice of IT projects by increasing understanding of the experience of RPM, reasons for RPM, effects of RPM, and different paths ending up with RPM situations. In addition, the theories would provide the means to predict and manage RPM in IT projects. Theories on RPM in IT projects may be partially connected to turnover theories. For example, in IS literature many studies are concerned about staff turnover (e.g., Baroudi, 1985; Jiang and Klein, 2002; Guimaraes and Igbaria, 1992; Igbaria and Guimaraes, 1999) but they do not take dismissal or involuntary turnover into account. However, in the management literature the dismissal has been taken into account (cf. studies on CEO dismissal, Fredrickson et al., 1988).

EVALUATION OF THE STUDY

Our proposal for the research agenda is restricted to theory development. Other approaches to advance research on RPM in IT projects might also be fruitful such as critical research. Furthermore, RPM is a general phenomenon characterizing project manager turnover in any project. Therefore, the study of RPM generally, and in project contexts other than IT, will be necessary and complementary for the research agenda suggested in this article.

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V

**REPLACING THE PROJECT MANAGER IN INFORMATION
SYSTEM PROJECTS: WHAT KNOWLEDGE SHOULD BE
TRANSFERRED?**

by

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Replacing the Project Manager in Information System Projects: What Knowledge Should be Transferred?

Maritta Pirhonen
Dept. of CS and IS
University of Jyväskylä
Finland
maritta.pirhonen@jyu.fi

Tero Vartiainen
Pori Unit
Turku School of Economics
Finland
tero.vartiainen@tse.fi

Abstract

Attempts to revitalise troubled information systems (IS) projects sometimes involve replacing the project manager. The replacement process may entail risks if the crucial knowledge that is critical for a project's success is not transferred to the successor. This exploratory study reveals the perceptions of twelve experienced project managers on what information should be transferred in case of replacement. The results suggest that knowledge on management issues, client organisation, decisions made, team members, and working atmosphere should be transferred whereas the transfer of unnecessary burden should be avoided. The findings are discussed and implications for practice and research are presented.

Keywords: Project Management, Knowledge Transfer, Replacement of the Project Manager, Information Systems Development

Introduction

Project is a typical work form in information systems development (ISD). IS projects are complex because a software project may involve software development, maintenance or an enhancement to software (Schwalbe 2004). In the hypercompetitive and chaotic (Kloppenborg and Petrick 1999; Yeo 2002) business environments, project managers face multitude of challenges (Boddy 2002; Maylor 2003) concerning, for example, risks (Wallace and Keil 2004) and quality issues as well as leadership (Smith 1999) issues.

A project manager is a key person in a project as she or he is to manage all critical project functions like planning, organizing, staffing, directing, and controlling (Thayer 1987). Reasons for failed projects are often traced back to managerial problems – not to technical problems. Knowledge is an essential resource in ISD projects. If managed effectively, knowledge can be used to decrease the time and costs involved in software projects, and to improve quality and customer satisfaction. Reich and Wee (2006) state: “A project manager’s primary task is to manage the knowledge bases of the team members and stakeholders so that they combine in the best possible way to successfully accomplish their assignment.” Projects in the IT field are faced with difficulties and organisational change. One of the most common ways in which organisational changes are brought about is through the replacement of key personnel. Replacing the project manager is common in software firms (Vartiainen and Pirhonen 2006; Aiyer et al. 2005, p. 37). When the manager to be replaced possesses critical knowledge, various knowledge gaps open up, and no one is fully aware of what has been lost. This often leads to instability in the project, and the question of knowledge transfer is thus raised. Although IS professionals agree that knowledge transfer is problematic in this context, little attention has been devoted to it in IS research. A study by Vartiainen and Pirhonen (2006) reports how attempts to rescue troubled IS projects include replacing the project manager, and that such a replacement affects almost everything in the project - the schedule, the cost, the team spirit, personal chemistry, and communication. However, there may be other reasons for the replacement, such as maternity leave, sick leave, or the replacement may be built in to the project process (when the project proceeds to the next phase).

Because knowledge transfer from the preceding manager to the successor is a complex task, one of the major challenges is to identify the valuable knowledge to be transferred. Failure to do so could lead to wasted activity and impaired project performance. Liikamaa (2006, p. 117) found that replacement of project manager and turnover in projects in production plants in various fields (e.g., energy field) prevents transfer of tacit knowledge.

The aim in our study was to determine what knowledge should be transferred when the project manager is replaced in an ongoing IS project. We therefore analysed the interviews of twelve experienced project managers concerning the knowledge that should be transferred from the outgoing manager to his or her successor. The study is descriptive in that we report categories of perceptions, and exploratory (Saunders et al. 2000, p. 97) in that the aim is, first, to identify the critical issues involved, and then to redefine the research question for the future research.

This paper is organised as follows. Section 2 reviews the literature related to tacit and explicit knowledge, and to transferring knowledge. The research design and data gathering are described in Section 3, and Section 4 reports the results of the analysis. Section 5 discusses the findings and presents implications for practice and research.

Highlighting forms of knowledge

Successful project management is based on both accumulated knowledge and the identification of crucial knowledge needed, and on the ability to utilise this knowledge. Process knowledge and experiences gained in previous projects comprise an important resource for project managers. In the absence of knowledge management, the managers are doomed to “re-inventing the wheel”, and possible to making the same mistakes made in previous projects. The completion of a project requires access to project-specific knowledge, which is useful for that project but is unlikely ever to be used again - such as knowledge on customers and suppliers (Leseure and Brookes 2004). Knowledge in this context includes knowledge of the project process (i.e. structure, methodology and status) and domain (i.e. industry, organisation, business processes, technology), and the necessary expertise, i.e. knowing where the expertise (such as programming skills) is located and who has it.

A number of academics and practitioners in the field of management have expressed an interest in the relationship between knowledge management and project management (Kamara et al. 2000; Gilbert and Holder 2000). A great deal of the know-how required in project management is tied to knowledge that is not written down in documents, but is rather realised through the expertise and understanding of the project manager. Next we discuss more specifically the definitions of the tacit and the explicit knowledge and the process of knowledge transfer.

Tacit and explicit knowledge

Knowledge is defined as justified personal belief that increases the entity's capacity for effective action (Huber 1991; Nonaka 1994). It is typically divided into tacit and explicit knowledge. Polanyi (1966) encapsulates the essence of tacit knowledge in the phrase, "We know more than we can tell", and provides further clarification of the concept in commonplace examples such as the ability to recognise faces, ride a bicycle or swim without even the slightest idea of how these things are done.

Tacit knowledge is derived from personal experience: it is subjective and difficult to formalise, acquire and transfer (Nonaka et al. 2000). Although tacit knowledge is informal, unstructured and mostly in the form of unconscious expertise contained in the heads of staff and stakeholders who have a relationship with the organisation, it can be converted into explicit knowledge (Nonaka and Takeuchi 1995). Tacit knowledge may be held by individuals in an employee's schemes, skills, habits and abstract knowledge (Lyles and Schwenk 1992; Starbuck 1992), or collectively in top-management schemes, organisational consensus on past collaborative experiences, firm routines, and firm and professional culture (Lyles and Schwenk 1992; Nonaka and Takeuchi 1995). It is often shared through highly interactive conversation, storytelling, and collaborative experience (Nonaka and Takeuchi 1995). Tacit knowledge is highly context- and history-dependent, and it is influenced by the individual situation.

Instead, explicit knowledge is codified and transferable in formal, systematic methods, such as in rules and procedures (Nonaka and Takeuchi 1995). Knowledge can be codified if it can be recorded or transmitted in the form of symbols (e.g., writing, drawings or speech), or embodied in a tangible form (e.g., machinery and tools). Explicit knowledge is more precisely and formally articulated than tacit knowledge. On the individual level it includes knowledge and skills that could be easily taught or written down, whereas collectively it resides in documentation, information systems, and rules (Brown and Duguid 1991, Starbuck 1992).

The process of knowledge transfer

An important process in knowledge management is that of knowledge transfer, which could be defined as the process through which one organisational unit is affected by the experience of another (Argote and Igram 2000). Gupta and Govindarajan (2000) conceptualised knowledge transfer (knowledge flows) in terms of five elements: (1) the value of the source unit's knowledge stock, (2) the motivational disposition of the source unit (i.e. the willingness to share knowledge), (3) the existence and richness of transmission channels, (4) the motivational disposition of the target unit (i.e. the willingness to acquire knowledge from the source), and (5) the absorptive capacity of the target unit, defined as the ability not only to acquire and assimilate but also to use knowledge. Frequency studies focus on the knowledge transfer channels (Alavi and Leidner 2001). Knowledge transfer channels can be informal or formal, personal or impersonal (Holtham and Courtney 1998). Davenport and Prusak (1998) highlight the difference between the more formalised transfer mechanisms such as documents and databases, and informal exchanges which are more casual events that usually take place face to face. Wathne et al. (1996) identified from the sociology and management literature four determining factors that influence knowledge transfer: openness (willingness to share knowledge and interact), channel of interaction (mail, telephone, face-to-face), trust, and prior experience (ability to internalize knowledge). According to Szulanski (2000), the basic elements potentially influence the transfer of knowledge: channel, message, context, recipients and source. Studies of knowledge management have identified different characteristics of the source, and one important factor that affects transferability is its perceived trustworthiness (Sarker et al. 2005, Szulanski et al. 2004; Wathne et al. 1996). However, "unless the implications of

experience can be transferred from those who experienced it to those who did not, the lessons of history are likely to be lost through turnover of personnel” (Levitt and March 1988, p. 328).

Research design

In order to increase understanding about the phenomenon of replacing project managers in an ongoing project we started an exploratory study with several open-ended questions (see the first findings in Vartiainen and Pirhonen 2006). One of the interview themes relates to what knowledge should be transferred in the case of the replacement of the project manager in IS projects. Managers in software firms located in four towns in Finland were contacted. The firms in question represent the vendor side, i.e. they implement software projects to meet the needs of their clients, which is a typical function of any software firm. Project managers with considerable working experience in software projects, at least five to ten years were selected. In all we interviewed 12 project managers during the spring of 2006. Their age and gender profile was as follows (age/Male or Female): 41/M, 42/M, 42/F, 59/M, 46/F, 57/F, 33/M, 50/M, 38/M, 35/M, 43/M and 41/M.

The interview themes were sent to the interviewees in advance. The second author of this article interviewed the first five subjects and the first author the others. One of the interview questions was as follows: “Describe what knowledge should be transferred to the successor project manager. What knowledge is critical?” When the interviewees described their ideas, they were prompted to describe in more detail what they meant. The following prompting questions were used: “Would you please describe in more detail what you said?” and “What else comes to mind?” The interviews were recorded and transcribed. For the analysis of the transcripts interpretive content analysis were applied (Lacity and Janson 1994 148): this approach takes account of the contextual circumstances in which the subjects frame their answers and the circumstances that influence the researchers’ interpretations. We then formed categories based on our interpretations of the subjects’ perceptions. We found that the subjects described other aspects of knowledge transfer in addition to the content. We therefore determined two viewpoints based on the subjects’ perceptions: crucial knowledge to be transferred and other significant aspects for knowledge transfer. Both of these are described in the next section.

Findings

This section explains the following viewpoints: Vital knowledge to be transferred (section 4.1), and Other significant aspects of knowledge transfer (section 4.2). Categories in both viewpoints are briefly described in each section.

Vital knowledge to be transferred

Management issues

The results achieved so far and management issues related to the project should all be transferred. Issues that were closely related to tasks, objectives, and results and their attainment, were among those mentioned. The following ones emerged: project organisation, resources, operational principles, ways of working in the project, processes, key persons, economic matters, timetables, project plans and other plans, risks, and meeting practices. Exemplary extracts follows:

PM8: *And then follow-up as facts, you know how much have we achieved as opposed to what we were supposed to achieve, and what goals have been reached, or however it is you’re measuring it.*

PM10: *A good description of the project in the master specs...Then a good specifications document that describes the project from all perspectives, like a commercial description, then like a user-perspective description and a technical description of the project...*

The client organisation, its objectives, and business

The objectives of the client in the particular project, knowledge and experience regarding the cooperation with the client, staff competencies in the client organisation, and the client's experience of project work all emerged as significant. In addition, knowledge of the client's business, and the environment in which the outcome of the project would be used, was considered one of the major issues, as was informal knowledge on the client's decision-making process and the staff.

Exemplary extracts follow:

PM3: Mostly to do with who the people are, what are their positions, what are their backgrounds, what are their roles in this project. Plus then the kind of informal information; who decides on things and who you can get information from, how you must deal with, and not deal with some person. That's the ideal situation, if you could get all this from the previous project manager.

PM9: ... So it's not just the project requirements, but more deeply what the client is trying to achieve with the software you are doing and how extensively it'll be distributed, so you can take testing seriously enough. If the software is to be distributed to millions of cell phones you'll want to test it a little better than if you're doing a not-so-important server or system where you can make corrections if necessary.

Decisions and the rationale behind them

Project managers make a series of decisions during each project. However, neither the decisions made nor the rationale behind them is necessarily written into the project plan or into any other project document. Awareness of the issues agreed with the client is valuable knowledge for the project manager. The following extract exemplifies these issues:

PM12: Well of course the project plan first, where you can see what you've agreed with the client and planned things, but there's probably a lot of the kind of silent knowledge, grey area, that contains everything unofficial, so the problem is transferring that feeling of how this project is going according to that supplier and according to that customer. If you could transfer that knowledge, although I don't know if there's a way of doing that, but one way is probably this kind of contact information or how the customer has been contacted and what information has been exchanged, that's the information you should be able to exchange. So these client systems, where you save these conversations and what you've agreed over the phone. Everything goes there in the project management, so the methods and tools are in that sense OK for you to save.

Team members

The project managers felt that knowledge about the team members should be transferred: their background, skills, workload, motivation, and how they had kept up with their work. Examples follow:

PM2: What's the resource situation, their workload? In other words, how much work do the people have?

PM3: Yeah, so it's the same thing there as well. Background, know-how, what kind of persons they are what kind of tasks they have in the project and how they've handled them. Then there's also this informal information. You have to be a little more careful with that.

Atmosphere and feelings

According to the project managers, knowledge of the working atmosphere and of feelings concerning the project, on the side of both the supplier and client, is valuable. Group dynamics and relations between team members should also be taken into consideration: there may be disagreement and conflict – not just within the supplier's team but also inside the client organisation - of which the successor project manager should be aware. Knowledge about problems and successes should be transferred. Exemplary extracts follow:

PM12... but certainly there's plenty of that kind of tacit knowledge, grey areas, wherein all the informal [knowledge] lies. The problem is how to transfer the feelings of both the supplier and the client about the project progress, if this kind of knowledge could be transferred. ...what the group dynamics are like... the preceding manager should be able to transfer information about how the team members co-operate with each other or if there is something [inside the group] that deserves attention.

PM6: There are such, how should I say, such circles or such [projects] involving many clients or different organisations of the client. They may quarrel with one another... And before you know it there's this kind of discord...

Other significant aspects of knowledge transfer

Accuracy in documentation

Given the possibility of deficiencies in project documents the new manager may consider it important to question the plausibility of the documentation given. The next extract describes how project managers do not always update the project plans.

PM9: It is useful to know how accurate the documentation is, if the project plan is up-to-date and if things are really going as she or he [project manager] says. I'm supposed to have read the project plan in advance, but I don't necessarily trust it... My experience tells me that project managers are not very active in updating the project plan...

Avoiding the transfer of unnecessary burden

The need to avoid transferring unnecessary burden was mentioned. The project may have involved failures and conflicts that have been resolved, in which case there is no need to transfer such knowledge because of the negative connotations. As one project manager stated:

PM5: There might be some troublesome matters that don't need to be dwelt on. They've been taken care of and there's no use informing the successor project manager and lumbering him with what has happened earlier.

In-depth discussions

In-depth discussions between the parties were considered important when a new manager begins the job. He or she should discuss project-related and other issues with the preceding manager and with the team members in order to get to know the personalities in the team. An example follows:

PM2: *The personal experiences of the outgoing project manager should somehow be conveyed, a kind of review of the project to the successor that specifically covers the problems and so on. On an even deeper level, it could be a one-to-one discussion so that you don't need other people. You'll go into more detail about the problems.*

Discussion

The findings of this study show that a whole range of project-related critical knowledge should be transferred when a project manager is replaced. This involves challenges in terms of identifying valuable explicit and tacit knowledge, and in determining how to transfer both types of knowledge from the preceding manager to the successor. There are also other factors affecting the transfer process, including the accuracy and trustworthiness of the knowledge and the different means of supporting the transfer, such as with in-depth discussions. Furthermore, it is suggested that there may be knowledge the transfer of which would be unnecessary for the successor (unnecessary burden).

Most of the knowledge needed for managing the costs and schedules is explicit and is stored in databases and documents (Davenport and Prusak 1998). However, it may well not enable the new project manager to familiarise herself or himself with the project history because even documented knowledge may require in-depth introduction with the help of face-to-face discussions. The successor manager should assess the trustworthiness of the acquired knowledge because the documentation may not be up-to-date (cf. Sarker et al. 2005; Szulanski et al. 2004; Wathne et al. 1996). Indeed, the findings show that there is plenty of valuable and necessary knowledge in project management that is not written down in the documents but that could be transferred in-depth discussions. This encompasses knowledge of cooperation between the team members as well between the project manager and the client, the personalities of the team members and the client representatives, and the rationale behind the decisions and the undocumented changes in plans and specifications.

The coordination of expertise in the team, as recognised by Faraj and Sproull (2000), emerged in the results of our study in how knowledge about team members, such as their backgrounds and skills, and about their work motivation and how they had kept up with it, was to be transferred. This is not unproblematic because the departing manager may be prejudiced against some team members and this may hinder future cooperation. The successful continuation of the project requires the successor to acquire knowledge from his or her predecessor, but also from the team members. In-depth introductory discussions were considered a means of transferring knowledge. However, in reality willingness to share knowledge varies: Foos et al. (2006) state that "project managers are not interested in the long-term ramifications of tacit knowledge transfer", although this could be vital knowledge in terms of the project success. Willingness to share knowledge also depends on the context of the replacement: if the project manager is replaced due to incompetence she or he is probably not eager to share her or his knowledge of the project with the successor, for example.

Implications for project management and research

The documentation of critical knowledge. One of the major tasks of the project manager is the management of project knowledge including formal documentation such as plans, reports, etc. The systematic documentation of mistakes and potential pitfalls helps to reduce the risks and to develop competencies (Schindler and Eppler 2003). The gathering of experiences and lessons learned does not usually take place systematically during the course of the project, but is rather left until the end. This could be a problem if the project manager is replaced the meantime because the experiences and lessons learned so far are not documented or available. Resources covering the documentation of experience throughout the project should be allocated in the project plan.

Maintaining a collaborative climate even if the project manager is replaced. A collaborative climate, which is recognised as a major factor influencing the effectiveness of knowledge work (Sveiby et al. 2002), should be maintained even if the project manager is replaced. Significant factors affecting to the knowledge transfer, openness, the degree to which the parties work

closely together on a common task, and trustful relations (Wathne et al. 1996), should be maintained and developed. If the replacement is made in order to rescue a troubled project, and trust in the project manager has been lost, maintaining a collaborative climate may be a major challenge. The means of doing so, even in crisis situations, should be developed.

The need for research on the replacement of the project manager. More in-depth research is needed in this phenomenon. Based on the results we hypothesize that in different projects (whether the difference relate to type of project, size of project, stakeholders involved, duration etc.) the criticality and effects of replacing project manager are different and the criticality of the knowledge transfer in such a situation also differs. The reason for the replacement of project manager and its effects to the process of knowledge transfer should be investigated. Future research should also consider the perceptions of senior managers, and how previous and following managers experienced the replacement.

Evaluation of the study

The subjects in this study were asked to produce descriptions of what project knowledge should be transferred to the successor project manager and what knowledge was critical. According to Fielding (1993), the problems with interviewing, however, include interviewee attempts at rationalisation, and the fact that the interviewees may fear being exposed. As the theme investigated may have been emotionally difficult for the interviewees we therefore refrained from asking them if they had experience of being removed from a project. As far as reliability is concerned, we recognise the fact that two researchers with different backgrounds and of different personality types conducted the interviews, and this may have caused response bias. On the one hand, both of us have a broad view of the issues because we have been teaching project management in cooperation with companies for several years. This strengthens the validity of our results. In terms of numbers, twelve interviewees represent a small population, and, therefore, more data is needed to produce a richer variety of perceptions. For the same reason we cannot generalize the results to all projects. In addition, as the research is in the exploratory phase, the more detailed research objective is needed. Finally, one of the strengths of the study is that by using subjects who were experienced project managers we were able to bring out the major viewpoints on the issue in question.

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VI

HOW IS PROJECT SUCCESS AFFECTED BY REPLACING THE PROJECT MANAGER?

by

Tero Vartiainen & Maritta Pirhonen, 2007

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How is Project Success Affected by Replacing the Project Manager?

Tero Vartiainen, Maritta Pirhonen

Turku School of Economics, Pori Unit, P.O. Box 170, FIN-28101 PORI,
FINLAND.

University of Jyväskylä, Department of Computer Science and Information
Systems, P.O. Box 35, FIN-40014 JYVÄSKYLÄN YLIOPISTO,
FINLAND

Abstract: Although replacing the project manager in an on-going project is not uncommon in the IT field, studies on the topic are scarce. In order to increase understanding in this area, we investigated the perceptions of ten experienced project managers on replacement from the perspective of project success. We focused on the critical success factors in the projects, on how the interviewees perceived the replacement of the manager, and on the effects it had. We found that replacing the manager was perceived as an attempt to rescue a troubled project, and as a pertinent part of it, especially in cases in which it strengthened the project process. Replacement was found to affect critical factors such as management and human-relations issues. The results are reflected through the literature, and implications for research and practice are presented.

Keywords: project management, information systems development

1 Introduction

The project is a typical work form in information systems development (ISD), and project-based organizations exist in the IT field. The project manager is a key person as he or she manages all the critical functions, including planning, organizing, staffing, directing, and controlling (Thayer 1987). Project managers face a multitude of challenges (Boddy 2002; Maylor 2003) in hypercompetitive and chaotic business environments (Kloppenborg and Petrick 1999; Yeo 2002), including risks (Wallace and Keil 2004) and quality issues, as well as leadership issues (Smith 1999). According to Jurison (1999), the project manager's broad experience and managerial and interpersonal skills form the basis for a successful project, and in practice, it is very difficult to find an experienced and available manager with the

right qualifications. The reasons why projects fail may be traced back to managerial rather than technical problems (Hartman and Ashrafi 2002). If managing a project is a great challenge, what effect does it have if the manager is replaced? The plurality of competencies and the managerial complexity (Blackburn 2002; Aladwani 2002) suggest that if the manager is to be replaced – for whatever reason – if the replacement is poorly handled it may have detrimental effects on the success of the project. Although the role of the manager and his or her leadership style and competence are very seldom identified as critical success factors (Turner and Muller 2005), we suggest that knowledge transfer from the preceding manager to the successor is a complex task. It is therefore worthwhile investigating the phenomenon of replacing the project manager in an ongoing project. Turner and Muller (2005) claim that the impact of the project manager on project success is ignored in the literature, and it is therefore not surprising that we did not find studies on replacing IT project managers in the literature on information systems. We aim to increase understanding in this area by investigating project managers' perceptions on replacement from the perspective of project success. We interviewed ten experienced project managers about this issue, and analyzed the data by taking an interpretive approach. The results show that replacement is mostly related to attempts to rescue a troubled project. Well-planned, it was perceived to strengthen the project process. It appears that replacing the project manager affects critical project-related issues.

Following this introduction, the literature on project management is briefly described, and the research design is presented. Then, the results are given and discussed in the light of the existing literature.

1.1 Projects and success factors

Scholars have taken different approaches in investigating success in projects. Research has concentrated on the overall objectives, and research on project-management success typically concerns cost, time and quality (Cooke-Davies 2002). Shenhar and Levy (1997) conducted a study on project success by surveying managers in product-development projects, and identified the following dimensions:

- Project efficiency (Was the project completed on time and within budget?)
- Impact on the customer (Does the project meet performance and functional specifications? Is the customer satisfied?)
- Business and direct success (Is the project providing the sales, income, profits and other benefits?)
- Preparing for the future (Is the firm more prepared for the future?).

Lyytinen and Hirschheim (1987) took a similar approach, albeit from a failure perspective, in defining the following four major categories of information systems (IS) failure:

1. correspondence failure (systems design objectives are not met),

2. process failure (the IS cannot be developed within the allocated budget and/or time schedule),
3. interaction failure (the level of end-user usage),
4. expectation failure (the system does not correspond with its stakeholders' requirements, expectations or values).

The studies mentioned above emphasize project success from the customer viewpoint, whereas research on success factors from the project-management perspective emphasizes the trinity of time, cost and quality, which has been found lacking. Turner (1999) therefore added two other dimensions to be managed: project definition and scope, and organization. He argues that the scope of the project delimits its boundary and is managed through the product and its breakdown, which are derived from a hierarchy of objectives ("vision, mission, facility, and team and individual objectives"). According to Lee-Kelley et al. (2003), Turner's (1999) model does not easily discern people-related issues such as leadership. Human factors were recognized as success factors by Pinto and Slevin (1988), for example, who included the personnel in the context of information systems projects. According to Turner and Muller (2005), the current literature on project success largely ignores the project manager's role. They predict that this will change in the future as more studies are undertaken. Inspired by Turner and Muller, we set out to increase knowledge in this area in this exploratory study concerning the phenomenon of replacing the project manager in a project-in-progress. The research design is described in the next section.

2 Research design

In order to obtain a tentative view on the issue of replacing the manager during an on-going project, we interviewed ten experienced project managers on the subject from the perspective of project success. We contacted project managers in software houses in the towns of Jyväskylä, Pori and Tampere in Finland. We used open-ended interview questions in order to encourage the subjects to describe all of the meaningful issues related to the research topic. We then formed categories based on our interpretations of the subjects' perceptions. First, in order to acquire an understanding of their perceptions of project success factors, we asked the following question: "What issues are critical factors in relation to project success?" We then asked them to openly describe what came to mind about replacing the project manager: "Describe what comes to your mind on the subject of replacing the manager of a project-in-progress." Finally, we asked the interviewees to describe the issues that were affected by the replacement of the project manager, and to say which of these were critical in relation to the project success: "What issues are affected by the replacement of the project manager? Which of these are critical in relation to the project success?" To prevent the interviews from becoming intrusive we refrained from directly asking the subjects if they had personal experience of replacement. They all had considerable working experience in software projects, at least five to ten years, and their age and gender profile was as follows

(age/Male or Female): 41/M, 42/M, 42/F, 59/M, 46/F, 57/F, 33/M, 50/M, 38/M, and 35/M. The first author of this article interviewed the first five subjects and the second author the others. When the interviewee described his or her ideas, he or she was prompted to describe in more detail what he or she meant. The following prompting questions were used: “*Would you please describe in more detail what you said?*” and “*What else comes to mind?*”? We analyzed the interview transcripts separately and produced tentative categories. We then compared our results and produced the final categorizations, which are reported in the following sections.

3 IT project managers’ perceptions of critical success factors

Three broad categories of critical success factors were identified from the project managers’ perceptions: “The management perspective”, “The human-issues perspective”, and “The context perspective.” In our formulation we used concern for the task and human issues as set out in Blake and Mouton’s (1978) managerial grid, and the idea that projects are surrounded by context (Boddy 2002). The categories were as follows.

The management perspective Perceptions related to the management perspective concerned the project objectives and their attainment. The following issues emerged:

- shared objectives,
- the management of resources,
- change management,
- the commitment of the client and the project team, and
- communication and interaction between the parties.

The parties involved in the project should have a similar view of the objectives, and the project manager should be capable of determining them. As one interviewee said: “...*the project has to have shared objectives...*” (PM8¹)

The efficient management of resources (human and financial), of the tasks and the schedule, and of any changes is critical to project success. The following extracts exemplify these issues: “*The schedule and money and the business goals are the things that must be achieved with the new application.*” (PM4). “*The schedule must be such that it is realizable.*” (PM6)

The commitment of the client and of the project team members came up in the subjects’ perceptions. The following extract refers to problems when client expectations are unrealistic, or when the client does not invest as much in the way of resources as expected: “*Yes, the client is committed to the outcome of the project and is part of it and of the decision-making.*” (PM3). Another point about a good team was raised by PM9, who stated that an incompetent project manager with a

¹ PM stands for the subjects, project managers, interviewed in this study.

good team could not make the project fail. Adequate and successful communication and interaction between the parties were critical success factors: “*Well, the first thing that came to my mind, one single thing that covers most of it...it is communication and this kind of successful interaction.*” (PM8)

The human perspective Human issues that are manifested in relations between people, their mental states and capabilities arose as critical factors in this category. The following issues emerged:

- relationships between people,
- motivation and attitude,
- competence, and
- trust.

Relationships between people participating in the project were perceived as critical. This means that it is not only team spirit and chemistry that affect the results, and that relations with client representatives and the project work culture are also critical. Project participants work in close contact with each other, and any deficiency in relations may put a damper on the whole thing. Openness and truthfulness were also considered important factors, as the following examples show: “*Chemistry and social skills: communicative skills and the ability to co-operate are quite important, and this reflects the organizational culture.*” (PM2) “*... And mutual openness, truthfulness and trust.*” (PM6)

Motivation and attitude were also mentioned as significant success factors, and in particular common enthusiasm and interest in carrying out the project – on the part of both the customer and the supplier: “*... and then, the customer is interested in the project... it has a big influence on the motivation of the team...*” (PM9)

Adequate competence in the participants (project manager, team members) was identified as critical: “*The project manager has to be mature, he or she must have experience and a view*” (PM1), and “*...skilful people who are able to use the tools...*” (PM6)

Trust between supplier and client was also perceived as critical: co-operation will suffer if there is a loss of trust. In the following extract, the project manager emphasizes the need for trust between the key players: “*The one thing that always matters. You have to gain the trust of the client and especially the trust of the key persons. If it is not gained, things will be relatively difficult.*” (PM4)

The context perspective Context is defined as the contemporary setting within and beyond the organization (Boddy 2002, 31; see also Kast and Rosenzweig 1985, 136). Perceptions related to the context refer to how actors affect or are affected by the project. The project receives resources from the surrounding organization, and the results (e.g., a new or modified IS) will be implemented in the environment of the client. The interviewees mentioned that it was essential to understand the business operations of the client and the context of the system use: “*...there the critical factor was that you really understood the environment in which the outcome of the project will be used.*” (PM10). PM9 said that the project had to get support from the organization: “*The project must have the support of*

the organization; the resources, telecommunications, and the infrastructure in general, that are needed in the project, must be available..."

4 Perceptions on the replacement of the project manager

In response to the free-form question about replacing the project manager, the subjects typically described the reasons behind and the situations that led to such an event. These deliberations were divided into two categories: "Replacing the project manager to rescue a troubled project," and "Replacing the project manager as part of the process". Some interviewees also deliberated on how the replacement should be carried out, thereby forming the third category: "Carrying out the replacement." These categories are described below.

Replacing the project manager to rescue a troubled project. Most of the subjects referred to replacing the project manager in negative terms: replacement was needed if the project was not going as planned, or was facing dilemmas (for example, the objectives would not be met in accordance with the schedule), and trust in the manager had been lost. When the trust is lost, the client may demand replacement. Similar demands may emerge from inside the project manager's organization, or even from inside the team. Trust in the manager may be lost if his or her capabilities and competence do not meet the requirements of the project, or if his or her way of working and communicating are perceived as deficient. Problems in the personal chemistry between the project manager and the client representatives also emerged as a reason for replacement. The following extracts give examples of the interviewee responses:

PM3: *"Mainly a situation where the project manager does not enjoy the trust of the client, the steering group or the client's staff. They do not trust his or her competence or way of acting as a project manager, or perhaps he or she is too inexperienced, or then a more experienced manager might be wanted. The situation has changed or has somehow gotten out of hand."*

PM2: *"Well, it can be a consequence of the fact that the outcomes do not correspond to the requirements or the project does not run on time and these things cause these chemistry concerns. For example, the client and the project manager might not get along with each other and then it is time to replace the project manager."*

Replacing the project manager as part of the process. In this case the replacement is described as a pertinent part of the project. The project manager may have special experience and know-how related to the tasks of certain phases. A manager with marketing or testing experience, for example, should be in charge during the related phases. This being the case, replacement between phases was perceived as strength. Secondly, if the project manager is replaced because he or she gets a new job or takes maternity leave for example, or if there is some other justified reason, the replacement is considered a pertinent part of project. In this case it may be easier for the team members to adapt to the new situation than in the cases be-

longing to the previous category. This kind of deliberation is visible in the next extract:

PM3: *In a case like this it is easier to familiarize [the new project manager] or transferring the tasks is easier, because there is a mutually accepted reason for this. ... I don't know how to say it, but in a case like that it's somehow part of the project. ... Normally the commitment of the whole group is different in this kind of situation and the solution is sought together.*

How the replacement should be carried out. On a few occasions the interviewee perceptions also referred to how the replacement should be carried out. In the worst cases the successor and the replaced manager do not meet at all (if the latter left immediately) and there are no introductory discussions. At best, the new manager comes from the project and has introductory discussions with both the client and the project team. This makes it easier for the new manager to take charge of the project.

5 IT project managers' perceptions of the impact of replacement

According to the interviewees, replacing the project manager may or may not have a significant effect on the project and its different aspects. The following two categories emerged: "The issues affected by the replacement", and "No effects if conducted professionally". They are described below.

The issues affected by the replacement. Many subjects expressed the view that the replacement affected "everything" in the project, including the project team, the client, and the task, and that it brought temporary "chaos". When questioned further, they raised the following issues:

- the schedule and cost,
- team spirit and personal chemistry, and
- communications.

Replacing the project manager affects the project schedule and costs because the process may be temporarily slowed down when the new manager introduces him or herself to the project, the team, and the client:

PM1: *"... and, of course, these kinds of cost effects may occur. Of course, the project always has a defined budget, within which it operates. The way this shows is that resources for transferring competence to the new project manager are needed, so that he or she understands every single detail. Somehow it delays every function."*

Replacing the project manager affects the personal relations among all parties. When a well-welded team gets a new manager it has to adapt to that person's characteristics and ways of working. Each team member has to build up his or her relationship with the newcomer. Given the pivotal role of the leader in terms of

communications in the project, anyone new to the role has to build the communication channels with all relevant parties (team members, clients, for example). Furthermore, information about the replacement should be communicated to all parties. Replacement even affects meeting practices, as managers have different ways of discussing and holding meetings, and it has a great influence on communication with the client: "...communication with the client. It is, after all, the primary contact party in many cases."(PM9)

No effects if implemented professionally. Some subjects did not consider replacing the project manager problematic if it was done professionally. As PM8 said, "... if the project manager leaves within a week, nothing extraordinary follows. Then you just must make sure the replacement is being planned and transfer as much knowledge as you can."

6 Discussion and implications

We considered the perceptions of ten Finnish project managers about project manager replacement in terms of the project success. In our analysis of perceptions of success factors, we combined the ideas of Blake and Mouton (1978) about two major management concerns - for the task and for human issues - together with the idea that projects occur in context (Boddy 2002). As a result, we ended up with three perspectives on success factors: management (e.g., cost, schedule, quality), human issues (e.g., relations, motivation), and context (e.g., understanding the context of the client organization). Although different from Shenhar and Levy's (1997) and Lyytinen and Hirschheim's (1987) definitions, we find this interpretation useful as it simplifies the three important aspects of project management into the upper-level themes of the task (management), human issues (leadership), and the context. Our interpretation is based on the qualitative approach, according to which we did not prioritize the subjects' expressions. In their quantitative study, Belout and Gauvreau (2004) conducted a correlation analysis and found a link between project success and the personnel factor, although it was not as significant as other factors such as the project schedule. Nevertheless, many scholars do find human-related issues critical (e.g., Smith 1999; Turner and Muller 2005).

We also analyzed the project managers' free-form perceptions about replacement. On the one hand, replacement of the project manager was perceived as an attempt to rescue a troubled project, but on the other hand it was seen as a pertinent part of the project: a person with special know-how may serve as manager during a particular phase. The interviewees also expressed ideas on how the replacement should be carried out. Discussions between the former and the current manager were considered indispensable. Our interpretation of these perceptions is that, in the case of a troubled project, replacing the manager without having adequate plans concerning replacement may cause significant damage to the whole

project. The subjects mentioned the schedule, costs, the team spirit, personal chemistry and communications as being particularly affected.

Implications for research and practice Developing the means of preventing problems from emerging in projects has been an objective of scholars engaged in research on project management and IS. Given the fact that replacing the manager has been and will continue to be used as a means of rescuing projects, the act of replacement should be studied further, and best practices for carrying it out should be collected. The risk of replacement should be taken into consideration in the project-planning phase, and plans made for that eventuality. It is worth noting that replacement could be used as a means of strengthening the project process, and that research on the effects and processes of deliberate and well-planned replacement should be conducted.

Evaluation of the study As Klein and Myers (1999, 74) state: "...the participants, just as much as the researcher, can be seen as interpreters and analysts", and accordingly in this study, the subjects were asked to produce interpretations of project success factors and of the replacement of project managers. The strength of the interviewing method is that it focuses directly on the study topic (Yin 1994). On the other hand, its weaknesses include the risk of bias due to poorly constructed questions, response bias, inaccuracies due to poor recall, and reflexivity, which means that the interviewee says what the interviewer wants to hear (Yin 1994). According to Fielding (1993), the problems with interviewing as a research method include interviewee attempts at rationalization, and the fact that the interviewees may fear being exposed. The implication is that people tend to avoid describing aspects of behavior or attitudes that are inconsistent with their preferred self-image. As far as this study is concerned, we recognize the fact that two researchers with different backgrounds and of different personality types conducted the interviews, and this may have caused response bias. Ten interviewees represent a small population, and more data is needed to produce a richer variety of perceptions. Furthermore, the theme investigated may have been emotionally difficult for the interviewees, and we therefore refrained from asking them if they had experienced being removed from a project. Finally, in our view one of the strengths of the study is that by using subjects who were experienced project managers we drew out the major viewpoints on the issues in question.

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VII

REPLACEMENT OF THE PROJECT MANAGER REFLECTED THROUGH ACTIVITY THEORY AND WORK SYSTEM THEORY

by

Tero Vartiainen, Heli Aramo-Immonen, Jari Jussila, Maritta Pirhonen & Kirsi
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Replacement of the Project Manager Reflected through Activity Theory and Work System Theory

Tero Vartiainen¹, Heli Aramo-Immonen², Jari Jussila², Maritta Pirhonen³, Kirsi Liikamaa¹

¹ Turku School of Economics, Pori Unit

² Tampere University of Technology, Pori, Department of Industrial Management and Engineering

³ University of Jyväskylä, Department of Computer Science and Information Systems

Abstract: Replacement of the project manager (RPM) is a known phenomenon in information systems (IS) projects, but scant attention is given to it in the project-management or IS literature. Given its critical effects on the project business, the organization, the project team, and the project manager it should be studied in more depth. We identified factors which make RPM occurrences inherently different and we show that work system theory and activity theory give comprehensive lenses to advance research on RPM. For the future research on RPM we identified three objectives: experiences on RPM, process model for RPM, and organizational culture's influence on RPM occurrences.

Keywords: project management, turnover, project manager

1. Introduction

The project manager is the key to project success [11 p. 575, 20 p. 181, 29 p. 189, 38]. Verner et al. [41] found that the capability of the project manager played an important role in project performance, and according to Nicholas [29 p. 172], the role is so central that ‘without it there would not even be project management - the project manager being the glue holding the project together and the mover and shaker spurring it on’. Given plurality of competences and the managerial complexity [6, 2, see also 8, 18] if the manager needs to be replaced – for whatever reason – poor handling of the replacement may have a variety of detrimental effects on the success of the project, on the team spirit, on the revenues, and on the new manager, for example (cf., [10]). Indeed, Vartiainen and Pirhonen [40] in their exploratory study found that replacement of the project manager (RPM) in an IS context was a critical event: it affected “everything” in the project and brought “chaos” to it. This is particularly the case if it is not professionally handled. It is

thus clear that RPM is a complex phenomenon as has economic and social consequences (e.g., for the client and the team). In order to add to the research on RPM in the IS context we introduce two theories, social-cultural-historical activity theory [42, 12] and work-system theory [3, 4]. The first of these provides an analytical framework within which to study human activity, and the second offers a systemic approach for a working organization. We also assess and compare the theories with respect to how they interpret RPM, and suggest some future research directions they inspire. In applying the theories we take the viewpoint of a project-based organization handling multiple temporary projects.

Following this introduction we briefly discuss the central role of the project manager and the prior literature on RPM. We introduce activity theory and work-system theory in Section 3, and in Section 4 we offer our interpretation of how the theories are applied to RPM and of the factors that make RPM occurrences inherently different. In section 5 we suggest future directions for research on RPM, and evaluate the study.

2. On the project manager's central role and RPM

The project manager is a key person as he or she manages all the critical functions of the project, including the planning, organizing, staffing, directing, and controlling [35, 25, 37, 26, 15]. Integration encapsulates project management in a single word [43 p. 12, see also 33]: it is the responsibility of the project manager to integrate the variety of equipment, supplies, materials, human resources and technologies needed to produce the product in conformance with the requirements, on schedule and within budget. There are four main groups of stakeholders with a vested interest in the activities and results of the project [36 p. 208]: project champions (e.g., investors, clients), project participants (e.g., the project manager, the project team, suppliers), community participants (e.g., political groups, community members), and parasitic participants (e.g., activists, the media). As we see it all these groups comprise the project organization. Project success has different meanings and different degrees of importance to stakeholders, but the goals nevertheless have to be defined and measured [36 p. 219]. Champions and participants have the strongest impacts on success. Moreover, if the interests of the champion are not satisfied the project is perceived to have failed. For these reasons recruiters face a critical decision in selecting the right project manager, someone who is able and willing to function in an autonomous mode and to take full responsibility for the decisions and accept full accountability for the project performance [17 p. 102]. Getting right person for the job is critical given the multitude of challenges to be faced [9, 28, 31, 37] in hypercompetitive and chaotic business environments [21, 44]. These include risk [39] and quality issues, as well as leadership issues [34]. The reasons why projects fail can often be traced back to managerial rather than technical problems [16, 37]. According to Jurison [19], successful projects

are based on the project manager's broad experience and managerial and interpersonal skills. In practice it is very difficult to find an experienced and available manager with the right qualifications [37 p. 10], which is why recruiting a successor in the case of RPM during an ongoing project is a critical task. We find surprisingly few studies on this in the literature.

Abdel-Hamid [1] studied the impact of managerial turnover on software-project performance. This study was simulation-based, conducted in a laboratory environment. The results indicate that managerial turnover may lead to a discernible shift in cost/schedule trade-off choices, which affect staff allocation and project performance in terms of cost and duration.

Parker and Skitmore [31] investigated project-management turnover and found that its causes were related to career and personal development, and dissatisfaction with the organizational culture and the project-management role. According to their results the turnover occurs predominantly in the execution phase, and the turnover event negatively affects the performance of the project team and of the project, and possibly the competitive advantage of the organization. Their study was quantitative in nature and the subjects represented project managers from an international aerospace company.

Vartiainen and Pirhonen [40] carried out an exploratory study on RPM, interviewing ten experienced project managers about what it meant, and what effects it had on projects. They also determined what kind of knowledge should be transferred from the preceding PM to the successor [32]. Most of the subjects referred to replacing the project manager in negative terms: replacement was needed if the project was not going as planned, or was facing dilemmas (such as the possibility of the objectives not being met in accordance with the schedule), and trust in the manager had been lost. When trust is lost the client may demand replacement. Similar demands may emerge from inside the project manager's organization, or even from inside the team. Trust in the manager may be lost if his or her capabilities and competence do not meet the requirements of the project, or if his or her way of working and communicating are perceived as deficient. Problems in the personal chemistry between the project manager and the client representatives also emerged as a reason for replacement. Vartiainen and Pirhonen's findings differ from those of Parker and Skitmore [31], who presented a pre-formed questionnaire to their subjects whereas Vartiainen and Pirhonen used open-ended questions. Dissatisfaction with the organizational culture and the job design did not emerge in the latter study, for example.

The above brief reflection on RPM shows that it is a multifaceted phenomenon and that it should be studied through theories that are capable of identifying the important approaches. We found two promising theoretical approaches to organizations and human activities, which we present next with reference to RPM.

3. The Theories

3.1 Work System Theory providing a Systemic View of RPM

Work-system theory incorporates both the static and the dynamic view of any system in an organization regardless of whether or not IT is involved, and regardless of the size of the organization [3, 4]. The static view identifies basic elements of the work system and the dynamic view focuses on how the system evolves over time though planned changes and unplanned adaptations. A project could be perceived of as a time-limited work system, the aim of which is to produce something and then to go out of existence [3 p. 46]. We argue that work-system theory offers a powerful lens through which to understand RPM from the viewpoint of a project organization. The project manager is the key person in managing the whole project, and therefore when RPM occurs the successor has to take control of all the elements included in the theory. From the static perspective the theory consists of the following elements.

Business processes describe the work performed within the work system. This work could be summarized in terms of one or more business processes in which the steps may be defined tightly or may be relatively unstructured. The activities in each one include information processing, communication, and decision-making. *The participants* are the people who perform at least some of the work in the business process. Some of them may use IT extensively, whereas others may use little or no technology. *Information* comprises the codified and non-codified information used and created as the participants perform their work. It may or may not be captured on a computer. *Technologies* include the tools (projectors and spreadsheet software, for example) and techniques (such as management by objectives and optimization) that the system participants use. *Products/services* represent the combination of physical things, information, and services that the work system produces, including any physical or information products, services, intangibles such as enjoyment, and social products such as arrangements and agreements. *Customers* are people who receive direct benefit from the products/services the work system provides. They may be external, receiving the organization's products/services, or internal in the case of employees and contractors. *The environment* includes the organizational, competitive, technical, cultural, and regulatory contexts within which the work system operates. It affects the system performance although the system is not directly dependent on it. *The infrastructure, in turn*, includes the technical and human informational resources on which the work system relies, as well as support and training staff, and shared databases, networks and programming technology. *Strategies* explain why the work system operates as it does, and may relate to the organization or the system.

From the dynamic perspective, the work-system life-cycle model incorporates the following phases [3 p. 47]: *Initiation*, which involves clarifying the reasons for changing the work system and what the changes will entail, and identifying the people and processes that will be affected; *Development*, which is the process of defining, creating or obtaining the tools and resources that are needed before the change can be implemented in the organization; *Implementation*, during which the desired changes are made operational; and *Operation and maintenance*, during which the work system is made to operate efficiently. This final phase continues until major changes are needed, at which point a new iteration of these four phases starts. Each of the above phases allows for planned and unanticipated changes. With regard to the implementation and operation/maintenance phase Alter [4 p. 95] recognizes “Unanticipated adaptations”, whereas in the initiation and development phases there are “Unanticipated opportunities”. RPM used to rescue a troubled project is indeed unanticipated, and as the findings of Vartiainen and Pirhonen [40] suggest, is connected to many of the static elements described above.

3.2 Activity Theory and the need for Expansive Learning in RPM

Activity theory distinguishes between temporary, goal-directed actions and durable, object-oriented activity systems (Figure 1) [42, 12, 23]. The case of project management concerns the latter. In this context the ‘activity’ has a broader meaning than ‘action’ or ‘operation’ (consider a football game as an activity and kicking a ball as an action, for example). Here the activity is the project as a whole. As applied in activity theory the concept of activity means linking events to the contexts within which they occur [7]. The process of the creation, use, and utilization of knowledge in an organization is not a spontaneous phenomenon. According to socio-cultural, historical activity theory there has to be a triggering action, such as the conflictual questioning of the existing standard practice in the system, in order to generate expansive learning [12, 30]. In this study RPM could be considered the triggering action. Expansive learning produces culturally new patterns of activity, and the object of the learning activity is the entire system (here the project) in which the learners (here the project members and manager) are working [13]. Figure 1 below illustrates the systemic structure of collective activity according to Engeström [12].

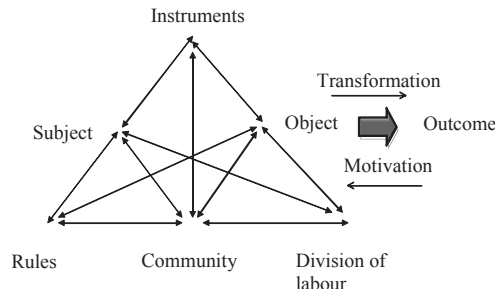


Figure 1. Systems of collective activity, adapted from [12 p. 962]

This study adopts the idea that the problem with management decisions often lies in the assumption that orders to learn and to create new knowledge are given from above [12]. The enabling of knowledge sharing is required in order to generate new knowledge in the organization. In the case of RPM there is either an external or an internal need for learning in the entire activity system (e.g., the project), which includes the new project manager. The external triggering action may be value conflict with stakeholders, for example, and the internal triggering action could be the project manager's lack of experience and competence, or conflict within the project organization (personal chemistry).

Engeström [12] suggests that the motivation to learn is embedded in the connection between the outcome and the object of the activity. The object of the collective activity (e.g., the project plan) is transferred to the practical outcome (e.g., an information system) (Figure 1). Achieving practical results through this transformation creates the motivation to change. Findings from research conducted among experienced project managers have confirmed that there is the motivation to share knowledge, but paradoxically there is very little evidence of practical knowledge sharing in the project organization [22]. Therefore it could be argued that there is a need for modeling action patterns such as RPM in order to ensure knowledge diffusion in the activity system of the project.

In the case of RPM the project organization has to effect transformations that are not yet in place. In other words, it has to learn and operate simultaneously. In practice RPM places the project group in a new social-network situation. Traditional learning theories define organizational learning as a process of detecting and correcting errors (e.g., single- and double-loop learning [5]). This tradition has little to offer in an RPM situation. On the other hand, the theory of expansive learning at work (based on activity theory) produces new forms of work activity [13]. An essential component of such learning is shared knowledge, which accumulates in the explicit form of rules and instruments (artefacts and tools) for example, and in the tacit form of cultural, historical, social, experience-based knowledge (Figure 1). This knowledge, which is tacit in nature, makes the new

project manager very dependent on the project's activity system. Next, we apply these theories to RPM.

4. Application of the Theories to RPM

The project manager is a key participant in the project process (Figure 2). We therefore describe him or her as his or her own entity, set apart from the “participants” (in work-system theory). When the project manager is replaced with a successor manager all the links between the role and the critical issues (all the elements in Figure 2) have to be maintained or even re-created. We applied both work-system theory and activity theory to the IS project context. Table 1 summarizes what each element means in this context.

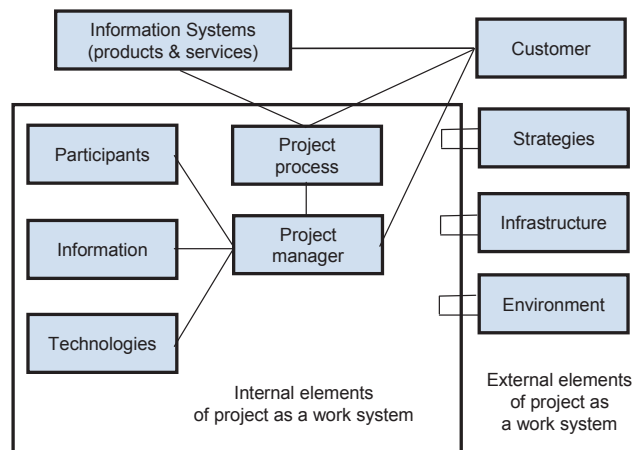


Figure 2. Elements of work-system theory (adapted from [3, 4]) to the project context

According to our interpretation the two theories provide insights that will enable future research to enhance understanding of, explain, and even predict RPM. Its causes most probably lie in the relation between the elements of the two theories and the project manager. In the following we further reflect on RPM as inspired by these theories on the basis of two extracts from the interviews with experienced project managers. Our reflection is based on our practical experience and our project studies in close collaboration with industry. The extracts are adapted from [40].

Table 1. Elements of the theories applied to the context of IS projects

Theory	Element level	Element	Application of the element to IS project contexts
Work System Theory	Internal Elements	Participants	People who are active in the project (e.g., project manager, team members)
		Information	Codified and non-codified information used in project work (e.g., user stories, project manager's and the customer representative's tacit knowledge, project member's personal notes)
		Technologies	Tools (e.g., project management software, programming language) and techniques (e.g., walk-throughs, use of user stories)
		Business Process	Project processes (e.g., contracting, managerial processes)
		Customer	People who benefit from the project results (e.g., users in the customer organization, the owner of business process)
	External Elements	Strategies	Project organization strategies; project strategies (e.g., project portfolio)
		Infrastructure	Technical, human and informational resources that the project relies on (e.g., hardware, support staff, intranets)
		Environment	Organizational, competitive, technical, cultural and regulatory environment of project (e.g., variety of operating systems, spoken languages and cultural differences, laws on data registration)
		Products/Services	The combination of artefacts and services the project produces (e.g., information system, maintenance service, user training)
		Activity Theory	Activity System
Rules	Rules of project management (e.g., norms in communication practices and walk-throughs)		
Community	The project team, the project organization		
Division of Labour	Role definition, task allocation, customer and end-user involvement (e.g., project manager and secretary selection, participatory design, on-site customer)		
Instruments	Tools, signs, symbols (e.g., project management tools, software, GANTT chart, iterative techniques)		
Object	Contracts, project plans, definition of software product (e.g., requirements definition)		
Outcome	An information system, trained users		

The authors asked the project managers in an open-ended question to describe what came to mind about RPM:

PM3: "Mainly a situation where the project manager does not enjoy the trust of the client, the steering group or the client's staff. They do not trust his or her competence or way of acting as a project manager, or perhaps he or she is too inexperienced, or then a more experienced manager might be wanted. The situation has changed or has somehow gotten out of hand."

PM2: "Well, it can be a consequence of the fact that the outcomes do not correspond to the requirements or the project does not run on time and these things cause these chemistry concerns. For example, the client and the project manager might not get along with each other and then it is time to replace the project manager."

The above extracts incorporate the main elements of the two theories: the project manager, the client, the client's staff, and the outcomes. Although RPM is described very briefly, its complexity in the project organization becomes clear when alternative situations are taken into account. Bearing in mind the elements of both theories we identified the following factors that affect RPM and make its occurrence in project-based organizations inherently different:

- A project-based organization as a whole could be perceived of as a work system incorporating many temporary projects (work systems). Organizational cultures [27] in project-based organizations most likely differ, as do the number of projects led by a project manager.
- Project types differ, and RPM may occur in different phases.
- The role of the project manager may differ in that he or she may have more of an administrative role or may be more or less involved in the implementation.
- The cultural and historical background and experience and the competence levels of the outgoing and successor managers also affect RPM.

Given this inherent complexity in the RPM phenomenon we need a comprehensive theory in order to understand it fully. We believe that work-system theory and activity theory serve this purpose. The core idea in activity theory is to study the community (here the project organization) and the subject (here the project manager) in a new pattern of activity (here RPM). This new pattern of activity can only exist through expansive learning in the whole work system (here the project organization). In addition, RPM inevitably engages the project organization (at the supplier's and the customer's sites) in a change-management situation. Therefore we argue that these two theories give us a powerful theoretical framework within which to study RPM in more depth.

5. Discussion

In this study we introduced activity theory and work-system theory for the purpose of studying RPM, and specified how the elements of these theories relate to the project-management environment. We also identified some factors that make RPM occurrences inherently different. We showed that the two theories are applicable for future studies on RPM. The strength of activity theory is that it describes learning and change in organizations, and in our application it describes the dynamics between the project manager and the project organization. Work-system theory was developed in the IS context, and it describes the project structure as a work system. It includes IS elements that are not considered in activity theory. In sum, we suggest that these theories provide promising analytical frameworks for future research on RPM.

First, the RPM phenomenon should be fully understood. In order to attain this goal RPM types and their characteristics (characterized according to the reasons for it and its consequences for project champions and participants, for example) should be determined, and individuals' (participants such as project managers and senior managers) experiences should be studied in terms of how RPM affects the project manager's professional identity, for example.

Secondly, there is a need to design a process model for RPM. We argue that such a model should take into account both the leadership (e.g., human and social

issues) and management (e.g., concern for production) perspectives (cf. [28 p. 264]). Recruiting a suitable successor manager to serve the needs of the whole project (cf. the competence perspective in [24]), transferring knowledge from the former to the successor manager (cf. Table 1), and ensuring support for both of them (cf. performance management in [14]) are all part of this process.

Thirdly, there is need to reflect on RPM from the perspective of the organizational culture and the system of shared values and beliefs it represents. We argue that it should support project managers facing RPM situations.

Evaluation of the study

This study is limited to the IS field, but the general nature of project management may make our interpretations applicable to other areas. As far as the validity of our interpretations is concerned, it is worth noting that three of the authors of this article have industrial experience of project management, and the other two have been involved in project studies in collaboration with industry. They are all engaged in research on project management.

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VIII

WHY PROJECT MANAGERS ARE REPLACED IN INFORMATION TECHNOLOGY PROJECTS: CONTRADICTIONS THAT EXPLAIN REPLACEMENTS

by

Tero Vartiainen, Maritta Pirhonen, Kirsi Liikamaa & Heli Aramo-Immonen,
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Why Project Managers are Replaced in Information Technology Projects: Contradictions that Explain Replacements

Abstract

Anecdotal evidence shows that project managers are occasionally replaced on information technology (IT) projects, but information systems (IS) and project management literature are silent on the issue. To fill this gap, we developed a substantive theory for explaining why project managers are occasionally replaced on IT projects. We used an interpretive approach for data gathering and analysis. Using interviews and questionnaires (n=43), we collected descriptions about replacing project managers (RPM) on IT projects. First, we identified disturbances from the data, such as conflicts and eruptions in terms of activity theory (AT), and then we inferred with abductive reasoning the contradictions and structural tensions underlying RPM occurrences. The analysis process was based on investigator triangulation because we individually analyzed the material and then together inferred the contradictions. We identified four contradictions: i) personal life situation becomes inconsistent with the project; ii) style of interpersonal conflict management does not support project success; iii) style of managing and leading an organization does not support project management success; and iv) project portfolio management is inconsistent with project management success. Because our findings indicate that three of the four contradictions concern implicit and explicit norms and conventions in IT projects of a cultural nature, future research should aim to develop IT project business culture. Future research should also consider RPM in project management in general. An educational implication is offered to contemplate RPM during student projects.

Keywords *IT project management, turnover, activity theory, contradictions, replacement, replacing, project manager*

1. Introduction

Information technology (IT) projects¹ are known for their failures and troubles. The Standish Group Report from 2009 estimated that 44% of IT projects were challenged by being late, over budget, and producing inadequate results (Standish Group, 2009). The failure rates could be explained by the fact that IT projects are very diverse. In contrast to projects in many other industries, IT projects are characterized by high complexity, unconformity, changeability, invisibility, and high chances of failure (Jurison, 1999; Schwalbe, 2010). In a construction project, such as building a house, it is relatively easy to separate building a fence and altering a floor plan, but in information systems (IS) projects, the elements affect each other, as well as existing IS (Dekkers & Forselius, 2007). The main characteristics can be summarized in seven categories (Peffer, Gengler & Tuunanen, 2003; Rodriguez-Repiso, Setchi & Salmeron, 2007): abstract constraints, difficulty of visualization, excessive perception of flexibility, hidden complexity, uncertainty, tendency of software failure, and goal to change existing business processes. Therefore, it is not surprising that when Wirth (1996) compared 41 projects in construction, utilities, pharmaceuticals, IS, and manufacturing, he found that uncertainty levels (e.g., budget deviation, duration deviation), were highest in IS projects, compared to other industries.

IT project managers confront a variety of stresses in their work, such as a lack of control over resources, dealing with new or unknown technology, work overload, and conflicting

¹ Concepts used in the literature with the same meaning are: software development project (Schwalbe, 2010), software project (Boehm & Ross, 1989; Cotterell & Hughes 1995; Keil, Lyytinen, & Schmidt, 1998; Wallace & Keil, 2004), information systems (IS) project (Schmidt, Lyytinen, Keil, & Cule, 2001), information and communication technology (ICT) project (Dekkers & Forselius, 2007). For the sake of simplicity, we use IT project meaning any IS project that the provider implements for the client.

needs of stakeholders (Richmond & Skitmore, 2006). Indeed, in contemporary organizations, work relies on the performance of individuals (Gällstedt, 2003), with the project manager perceived as the most important factor in a project's success (Cleland, 1984; Jurison 1999; Kezsbom, Schilling, & Edward; 1989; Nicholas, 1994). Project management cannot exist without a project manager, who is the glue holding the project together, the mover and shaker (Nicholas, 1994) (cf. project manager's status in agile projects, where the role of the project manager is not so central).

Anecdotal evidence shows that project managers are occasionally replaced on IT projects, but IS and project management literature are silent on the issue. Our literature review on replacing project managers (RPM) revealed only two journal articles directly related to RPM (see the process of literature review in Appendix 1). The first article by Abdel-Hamid (1992) considered managerial turnover and data was gathered in the context of a roleplaying project simulation game. The subjects of the study were graduate students at a US business school studying computer systems management. The results of the study showed that managerial turnover can lead to a considerable shift in costs or schedule trade-off choices, affecting staff allocations, and, eventually, project performance in terms of both costs and duration. The second article by Parker and Skitmore (2005) dealt with the aerospace field, and they collected data from a group of project managers at an international aerospace company. The results of their study showed that turnover disrupts and negatively affects the performance of the project team, the project, and potentially negates the organization's competitive advantage. These two articles show that RPM is a recognized phenomenon in research, but also that RPM in IT projects has not yet been properly studied. Some articles indirectly concern RPM (see Schmidt et al., 2001, on staff volatility, for example).

As a step toward advancing research on RPM in the IT field, we posit the following research question:

RQ: What are the underlying reasons for RPM in IT projects?

Our focus is on unplanned RPM and we exclude those RPM occurrences that are pre-planned (e.g., in each phase of the project, there is a new project manager; see Anonymous 2007). To understand the underlying reasons, we adopt the activity theory (AT) as our lens to explore this phenomenon. AT (Engeström, 1999a, 1999b; Leont'ev 1978; Vygotsky 1978) can be used to analyze any activity, such as those in an organization. The strength of AT is that it allows for breaking down the structure of an activity into smaller categorical elements (Basharina, 2007), and to identify contradictions and structural tensions of the activity (Engeström, 1995; Engeström, 2001). Contradictions relate to tendencies or forces that need each other, but, at the same time, negate each other. The contradictions generate disturbances, conflicts, and eruptions in an activity, thus making contradictions indirectly visible. Contradictions can also be sources of innovation in activities because it is possible that new forms and qualitative stages of activity emerge as solutions to the contradictions (Engeström, 1987). These being the case, we argue that the AT provides us with the proper theoretical lens to study the underlying reasons for RPM in IT projects.

Our results reveal four contradictions leading to RPM in IT projects: i) personal life situation becomes inconsistent with the project; ii) style of interpersonal conflict management does not support project success; iii) style of managing and leading organization does not support project management success, and iv) project portfolio management is inconsistent with project management success. Based on these findings, we offer implications for research and practice to develop the state of affairs with respect to RPM.

After the Introduction, in Section 2, we introduce the AT that we use as a framework to analyze the reasons for RPM. In Section 3, we show how we gathered the data. In Section 4, we present our analytical process, and, as a result, the four underlying

contradictions (in terms of AT). In Section 5, we discuss the results with respect to the existing literature, and we provide implications for practice and research. Finally, we evaluate the study.

2. Activity theory

The history of the activity theory (AT) has three main origins. First, it originates from the work of the classical German philosophers, Kant and Hegel, in which the concept of activity was first introduced. Second, Marx and Engels elaborated on the concept of activity. The third source is the Russian cultural-historical psychology founded by Vygotsky (1978). Leont'ev (1978), building on the work of Vygotsky (1978), stated that the smallest meaningful unit of analysis is an activity which comprises people using artifact to achieve their goals. Leont'ev's original formulation of an activity was further developed by Engeström (1987), who added the rules, community, and division of labor to the basic triangle of the subject - object – tool (Figure 1). Following Engeström (1987), human activity is represented in a triangular shaped model composed of three peaks and its connecting sides. The larger activity triangle contains four sub-triangles: production, distribution (rewards, tasks, and responsibilities), exchange (social interaction and communication), and consumption.

AT has been used in different fields of research (Iivari & Lyytinen, 1998; Rogers, 2008). The traditional application has been in the areas of learning and teaching, including workplace learning (Blackler, 1993; Blackler, Crump, & McDonald, 1999; Engeström, 2000; Engeström, 2008; Engeström & Sannino, 2010; Engeström, Miettinen & Punamäki, 1999; Helle, 2000; Karasavvidis, 2009; Koschmann, 1998; Murphy & Rodriguez-Manzanares, 2008; Roschelle, 1998). AT as a framework for human-computer interaction research and design, computer-supported cooperative work, IS development, and product design has been widely used (Bertelsen & Bødker, 2000; Bødker, 1989, 1991; Diaper & Lindgaard, 2008; Kaptelinin, 1996; Korpela, Mursu, &

Soriyan, 2002; Kuutti, 1991; Nardi, 1996), but does not seem to have been used on IS project management research.

A model of the structure of an activity system (AS) includes two types of constituents: core components, such as subject, object/outcome, and community; and mediatory components, such as tools, rules, and division of labor (Figure 1). An activity is a collective phenomenon; it has a *subject* (an individual or collective) who understand its motive, and who uses *tools* to achieve an *object*, thus transforming objects into outcomes. An activity is always associated with long-term purposes and strong motives. All members of the *community* share the object (and the motive) of the activity. Tools mediate between a subject and the object, which is transformed into the outcome. The object is seen and manipulated within the limitations set by the tools. Rules mediate the relationship between the community and the subject, while the division of labor mediates the relationship between the community and the object. Rules cover both implicit and explicit norms, conventions, and social relations in a community as related to the transformation process of the object into an outcome. The responsibilities of the members of the community are coordinated by some division of labor (e.g., the division of tasks and roles among members of the community and the divisions of power and status), yet guided by rules. These rules regulate, as well as constrain, their actions and relationships in the activity system (Engeström, 1990; Kuutti, 1996).

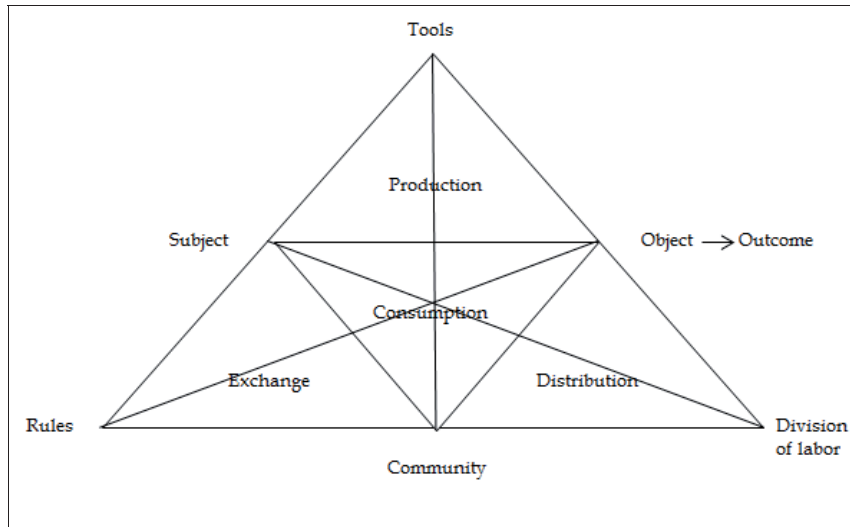


Figure 1. The structure of human activity (Engeström 1987, p. 78)

An activity is made up of one or more actions, the completion of which satisfies the initial object (motive). An activity and all associated actions are realized in specific contexts that determine the conditions under which the actions and the initial motive can be satisfied (e.g., availability of tools). Activities can be considered as having three hierarchical levels: activity, action, and operation (Kuutti, 1996). Actions are conscious, goal-directed, and must be undertaken to fulfill the object (Table 1). They are implemented through automatic operations that do not have their own goal. An operation is like a non-conscious event within an action. Different actions may be undertaken to meet the same goal. Similarly, operations may contribute to a variety of actions. All operations are actions at the beginning, but when the action has been practiced long enough, it becomes an operation. The border between an action and an activity is fuzzy, and movements are possible – in both directions (Engeström, 1987; Kuutti, 1991)

Table 1. Leont'ev's three-level model		
Unit	Directing factor	Subject
Activity	Object/motive	Collective
Action	Goal	Individual or group
Operation	Conditions	Non-conscious

Kuutti (1991) uses an example of activity – action – operation, dividing the activity (motive) of completing a software project. In this design, ‘programming a module’ or ‘arranging a meeting’ are at the action level, and ‘using operating systems commands’ or ‘selecting appropriate programming language constructs’ are at the operation level.

To summarize, activities are carried out by subjects, motivated by an object, who transform the object into an outcome. An object may be shared by a community of people, working together to achieve a desired outcome. Tools, rules, and a division of labor mediate the relationship between the subjects, community, and the object.

An overview of the principle of contradiction

Engeström (1987) inserted the concept of contradictions onto Vygostky's (1978) thinking, and also classified four different types of contradictions onto activity systems (see Figure 2). Contradictions constitute a key principle in AT and are characteristic of activity systems. Kuutti (1996, p. 34) describes contradictions as “a misfit within elements, between them, between different activities, or between different development phases of a single activity”. They are developmentally significant and exist in the form of resistance to achieving goals of the intended activity, and as emerging dilemmas, disturbances, and dis-coordinations. Contradictions are important because they can result in change and development (Bødker, 1996, Engeström, 2001). They generate “disturbances and conflicts, but also innovative attempts to change the activity” (Engeström, 2001, p. 134). In spite of the potential of contradictions to arise in an activity system, this transformation does not always occur because contradictions may not be

easily recognized or acknowledged, visible, or even openly discussed by those experiencing them (Engeström, 2001). On the other hand, contradictions that are not discussed may be those that are embarrassing, uncomfortable, or culturally difficult to confront, such as personal habits, bad behavior, or an incompetent leader. For example, Engeström (1987) classifies contradictions within and between activity systems as the driving forces in learning and development. He separates four levels of contradictions (numbers in Figure 2 refer to the levels of contradiction):

- Level 1: Primary inner contraction (double nature) within each constituent component of the central activity.
- Level 2: Secondary contradiction between the constituents of the central activity.
- Level 3: Tertiary contradictions between the object/motive of a culturally more advanced form of the central activity.
- Level 4: Quaternary contradictions between the central activity and its neighbor activities.

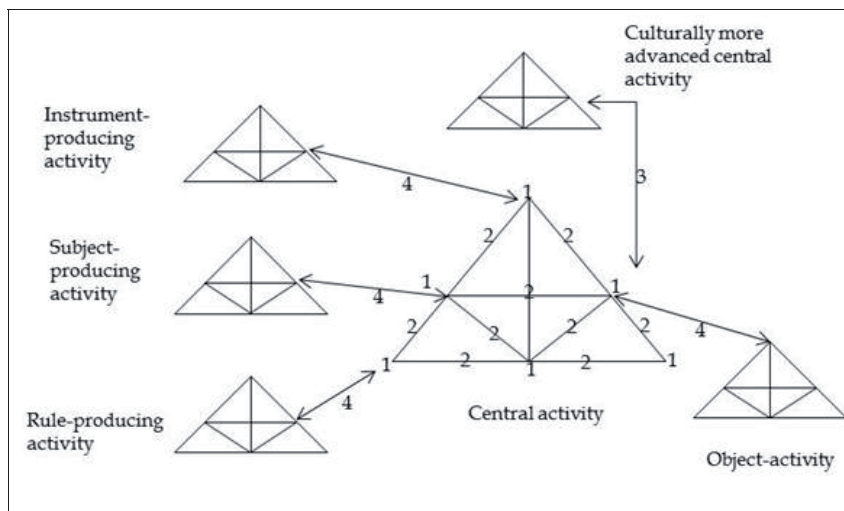


Figure 2. The structure of human activity (Engeström 1987, p. 78)

Primary contradictions found within a single constituent of an activity can be understood in terms of disturbances between actions that discover the activity. These actions are typically poly-motivated. That is, the same action is executed by the same person as a

part of two separate activities, and this poly-motivation may cause subsequent contradictions.

The neighbor activities first include the activities where objects and outcomes of the central activity are embedded (object-activities). Second, they contain activities that produce the tools for the central activity (instrument-producing activities). Subject-producing activities include activities such as education and schooling. In addition, they contain, for example, administration and legislation activities or rule-producing activities (Engeström, 1987).

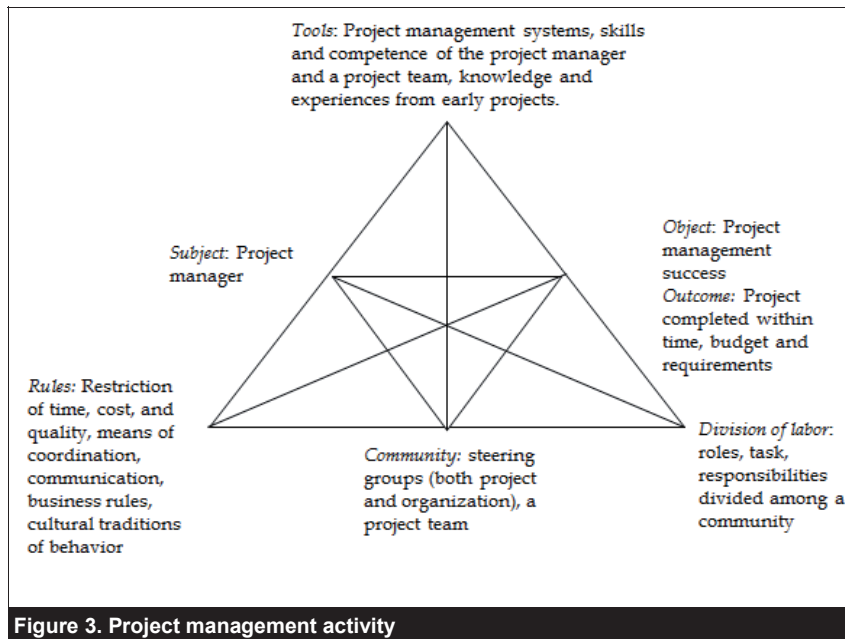
An example of an instrument-producing activity could be a project management system activity that supports the project managers in their work by producing project track reports, Gantt charts, and so on. Project management education is one example of a subject-producing activity. Its object is to enable students to develop skills needed in real-life project management.

An example of a quaternary contradiction is one that occurs between a project management activity (central activity) and project management education (subject-producing activities). If the outcome of the education activity does not produce competent students for the needs of real-life project management, a contradiction results between the central activity and subject-producing activity.

An interpretation of project management as an activity system

We interpret project management as an AS (Figure 3). The goal of project management is to use the available resources effectively and efficiently to accomplish set goals with certain criteria on schedule and within budget (Liu & Horowitz, 1989). More specifically, the function of project management includes defining the requirements of the work, establishing the extent of the work, allocating the required resources, planning the

execution of the work, monitoring the progress of the work, and adjusting deviations from the plan.



Meaningful activities are rarely accomplished individually, but with project management being the issue, the subject is an individual project manager who actually does manage the project. Project management success – completing the project on time, within budget and to specifications – is the object of the project management AS. Rules include a written plan of action (e.g., contracts, project plan, communication plan, etc.) with time restrictions, cost estimates, and quality objectives, as well as unwritten cultural traditions and business rules produced in management activities. Tools include project management systems (e.g., software, standards), skills, and competence of the project manager (e.g., leadership skills, communication skills, decision making skills, coping abilities, analytical thinking, and technical competence), and the skills of the project team. In addition, tools include the knowledge and lessons learned from earlier projects.

Community encompasses organizations, project teams, and steering groups on both sides of a project (e.g., project managers for both the vendor and customer, representatives of senior management, stakeholders, and experts). Among other things, the community decides on resource allocation and controls the project budget. The division of labor encompasses the tasks, roles, and responsibilities divided among the community according to the project plans.

Data gathering

We reveal the contradictions (Figure 2) in IT projects (Figure 3) with respect to RPM. As our research question concerns the underlying reasons for RPM in IT projects, we argue that the most efficient way to get a full picture of this phenomenon is to collect real-life descriptions. Therefore, our study is interpretive in nature as we interviewed IT practitioners in the field and classified their perceptions with respect to the kinds of disturbances and underlying contradictions, in terms of AT, we identified in their descriptions. There were seven phases of data gathering (see Appendix 2 for demographic data of the subjects).

First, 12 project managers with considerable working experience (5–10 years) in software projects were interviewed in spring 2006. Their companies mostly represented large enterprises located in four towns in Finland. The first author interviewed five subjects and the second author seven. We recorded all the interviews and had them transcribed. The interview questions were as follows:

Describe what comes to your mind on the subject of replacing the manager of a project-in-progress.

What issues are affected by the replacement of the project manager?

When the interviewees shared their thoughts, they were prompted to describe in more detail what they meant by asking, "Would you please describe in more detail what you said"? and "What else comes to your mind"?

Second, the first author interviewed four supervisors of project managers in three large project-based companies in the IT field at the end of 2009. The interview questions were designed as open-ended in nature to guarantee a free and open train of thought for the subjects. The supervisors were given the following tasks:

What comes to your mind about replacing a project manager?

What kinds of experiences have you had with this issue in your organization?

The four supervisors all had considerable experience with leading project managers, and with handling RPM situations. The interviewer made probing questions about the reasons leading to RPM.

Third, the second author interviewed four IT professionals in one large software company in Finland in 2009. They all had considerable experience with IT projects and all had dealt with RPM situations. The interviewees were given the following interview themes (among others):

How did you end up with the replacement situation?

What issues are affected by the replacement of the project manager?

How does the replacement of a project manager impact on project success?

Who made the decision of replacing the project manager?

Fourth, we sent a web questionnaire to 101 members of a special group of project managers in a professional association in spring 2010. The response rate was 18% (n=18), and the respondents were asked open-ended questions:

Describe why a project manager could be replaced during a project.

Describe the underlying causes for replacing project managers.

Describe in detail a situation resulting in replacing the project manager.

Fifth, the first author interviewed further six of those who responded to the questionnaire and expressed an interest in being interviewed. These interviews were conducted in the fall and winter of 2010. Five of these subjects represent top and middle management and one is an experienced project manager. At the beginning of the interviews, the interviewer asked the subjects to recall RPM occurrences in their experience and to discuss the reasons why RPM was initiated.

Sixth, the second author interviewed further four experienced project managers on their experiences with RPM in the IT field. The interviewer asked the subjects to describe their experiences with RPM, including the reasons for RPM. These interviews were conducted during 2010. The interviewer asked the following questions (among others):

How did the situation of the replacement end up?

What issues are affected by replacing the project manager?

How does replacing a project manager impact on project success?"

Who made the decision to replace the project manager?

Seventh, the second author asked an experienced IT professional to describe her experiences with RPM. She described her experiences, including the reasons for RPM, in an email.

Table 2 summarizes the yearly data gathering. More specific information on interview and questionnaire subjects is found in Appendix 2.

Table 2. Summary of the interviews conducted and number of email responses.					
Year	2006	2009	2010	2011	Total
Number of interviews conducted	12	8	10		30
Responses to a web questionnaire			18		18
E-mail response				1	1
Totals	12	8	29		49

3. Analysis process and results

Analysis was an iterative process and proceeded as follows:

1) The first author produced a preliminary interpretation of the contradictions from the empirical material that was gathered (empirical material 1, 2, 4, and 5). The third author produced another interpretation of the contradictions that had similarities and differences compared to the analysis of the first author. It was decided that all research team members should familiarize themselves with all of the empirical data; therefore, more in-depth analysis was done.

2) All four authors analyzed the data separately to identify the disturbances. The second author created a preliminary table for disturbances. The table was checked by all authors and some new disturbances were added and some removed.

3) All authors went through the data using the table created in Phase 2 as assistance. We transferred all disturbance occurrences from all authors to a new table (n=512). All disturbance occurrences were discussed, and a decision was made to collate the list and tabulate the frequency of each particular issue. We identified 23 separate disturbances, which are listed in Table 3 along with their frequencies.

4) At this stage, we had an overview of the disturbances in the data. Then, with abductive reasoning - using existing literature to support our interpretations - we derived the contradictions that explain the emergence of disturbances and RPM (Table 4). A discussion of the disturbances and contradictions follows Table 4.

Disturbances

Table 3 summarizes 23 visible disturbances that we derived from the data. Based on these disturbances, we inferred the contradictions that are reported in the following section.

Table 3. Disturbances and their frequencies.	
Reason	Frequency
New job (inside or outside an organization)	28
Inadequate competence, inexperienced PM (e.g., inadequate interpersonal skills, pressure intolerance)	21
Chemistry problems	19
PM is needed in another project inside the organization	17
Sick leave	16
Client demands a replacement	15
Objectives are not accomplished or project is not proceeding	11
PM has too much work	11
Maternity or paternity leave	9
Planned in advance	6
Not the right PM (unsuccessful recruitment)	6
PM not motivated	6
Lack of trust (e.g., from board, team, client)	5
PM wants new challenges	5
Dissatisfaction with PM	4
PM wants to leave	4
Organizational change (reorganizing duties)	3
Terminating employment (PM leaves project for a permanent job)	3
Poor interaction or communication between client and PM	3
Senior management is dissatisfied with PM	2
PM hides problems of the project from a board or a client	2
Disagreements between PM and a team	2

PM acts against the values or practices of a client	1
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Contradictions

Table 4 summarizes our interpretation of the contradictions that affect the emergence of RPM in IT projects. The Level column describes the constituents or elements that oppose each other, but which are, nevertheless, connected and dependent on each other. Our analysis followed abductive reasoning as we inferred the contradictions from the subjects' descriptions, but we also used literature to support our interpretations. Next, the four contradictions are presented.

Table 4. Underlying reasons affecting the emergence of RPM in IT projects.	
Underlying reason	Level
Contradiction 1: Personal life situation becomes inconsistent with the project	Level 4: individual life AS vs. project management AS
Contradiction 2: Style of interpersonal conflict management does not support project management success	Level 2: rules vs. object
Contradiction 3: Style of managing and leading organization does not support project management success	Level 2: rules vs. object
Contradiction 4: Project portfolio management is inconsistent with project management success.	Level 2: rules vs. object

Contradiction 1: Personal life situation becomes inconsistent with the project (individual life AS vs. project management AS)

Our data showed that project managers face challenges in balancing their personal lives (or life AS) and the projects they are managing. It may occur that the personal life situation becomes inconsistent with the current project or even with the job in the company. In total, we recognized seven disturbances generated from this contradiction: new job (n=28), sick leave (n=16), PM has too much work (n=11), maternity or paternity leave (n=9), PM wants new challenges (n=5), PM wants to leave (n=4), and PM leaves project for a permanent job (n=3). The following disturbances explain this contradiction: new job (inside or outside the organization) and terminating employment mean that the

project manager may get a new job from another organization or may be transferred to another job in the organization (the disturbance analysis did not reveal the numeral division between inside or outside the organization). These, however, are related to the disturbance of the project manager wanting new challenges or a permanent job. These disturbances relate to the willfulness of developing oneself professionally that can be interpreted as part of one's "life plan". With respect to private life, sick leave and maternity or paternity leave mean that the project manager's life situation makes it impossible to continue in the job, thus RPM occurs. The following examples exemplify the disturbances:

Interview Subject 24: "The better offer of work. Project manager wants quality of life. Project is uninteresting, no future. Home life, the partner asks to leave, work days of 12 hours and [project manager] changes job".

Interview Subject 29: "Maternity leave...change of job for different causes, demanding project".

Interview Subject 13: "I think the most common reason for replacing is when the working environment is very hectic with long working hours. This oppressive situation makes the project manager him or herself to want to leave the project".

Interview Subject 29: "Project manager tires himself out working too hard. Stress".

Interview Subject 15: "The project manager seeks more demanding job during the project".

Interview Subject 20: "Project manager got seriously ill and he was more interested in his health than the project".

Interview Subject 42: "And perhaps high turnover may be a result of having a permanent job, if you can choose between terminable and permanent job, people leave immediately, they spare no thought for [staying], I should leave too".

To summarize, there is a structural tension between the life system of the project manager and the project management AS. Interests or situations in private life may be inconsistent with the project to such an extent that the project manager leaves the project and RPM occurs.

Contradiction 2: Style of interpersonal conflict management does not support project management success (rules vs. object)

Interpersonal conflicts are pervasive in organizational life and in IS development (e.g., Barki & Hartwick, 2001). Therefore, it is not surprising that our analysis of disturbances showed that chemistry problems (n=19) were a major reason for RPM. In addition, lack of trust of the project manager (n=5) was mentioned as a reason for RPM. Our data did not show the content or reasons for chemistry problems or lack of trust, but, nevertheless, in many cases relations deteriorated between the project manager and the client or team - in some cases without any expressed knowledge on the reason for the deterioration. As a resolution for these situations, RPM was declared by the management to guarantee the project proceeding. Especially in the case that the client demands RPM, the management has no other choice. With respect to interpersonal conflict management, the literature shows that there are different styles to manage such conflicts (Barki & Hartwick, 2001): According to personal problem-solving style, the participants of a conflict aim to fully satisfy the concerns of all involved parties, and each participant aims to win the conflict. In our interpretation of the project management community (e.g., team client, project manager), there seems to be an immature conflict management style in use as RPM can be perceived as a simple black-and-white solution for chemistry problems. There are more sophisticated approaches available (see Barki &

Hartwick, 2001), and using them would benefit project management if the project manager can be retained because RPM causes chaos in an IT project (Anonymous 2007). In the next section, examples of chemistry problems are presented. In the following example, the project manager was replaced because the personal relations between the project manager and the client deteriorated. The replacement was perceived as an unjust act by the replaced project manager, but getting the project done was considered more important:

Interview subject 41: "In practice it lead to a situation that the communications between the project manager of provider and the project manager of client did not work. The pal from the provider side said that 'Okay. This should be done but your environment is not ready', and as a response, the project manager of client said that I cannot do that because you have not delivered the specifications. So, this means that at the beginning they got out from the bed on the wrong side - they were not constructive. ... Although [the project] proceeded and the board was reported that the right direction had been taken; however, the communication between these two central persons did not work. Then, when the board got information that the project is behind the schedule, the project manager from client side declared that it is the fault of the project manager of provider and that he does not know his stuff. The client representative asked 'What shall we do now?' The situation was against the brick wall, meaning that the personal chemistry did not work. What is the reason for this is very hard to say. We have to get a new person to reset the situation and get the project to proceed. The only option was to replace the project manager. The project manager of the provider feels, of course, this as unjust [decision] as he did his best, but in this situation it did not matter. ... What happened was that we took a new person into project, and the preceding project manager run the new guy in, and after the turnover, the

mode in the project was changed, and the end results was nearly what we wanted, well, not perhaps in schedule but it did not run late much”.

The following examples show that although the project presumably was proceeding, the relations between the project manager and the client were not functional; therefore, the client demanded RPM:

Interview Subject 15: “Personal relations are not functional. Although the project goes formally well, there are mutual argumentations and differing viewpoints; in such situations, one is forced to replace. And it is even worse if the demand is from the client side. In such a situation there are no options”.

Questionnaire Response 38: “The client gave weak feedback on the project manager although he or she thought that he or she managed well [the project]. At the background, the reason was in personal chemistries, this is to say, the project manager of client and the project manager of provider did not get along. Replacing the project manager was brought out in the steering group and there was no other option than to agree the replacement”.

To summarize, the style of interpersonal conflict management is over-simplified, and viewed as black and white among community members (e.g., client, team, project manager) to support project management success (rules vs. object).

Contradiction 3: Style of managing and leading organization does not support project management success (rules vs. object)

Inadequate functioning of management may eventually lead to RPM in IT projects (cf. Al-Ahmad et al., 2009; Fortune & White, 2006 for the lack of executive support in IS projects). Managing a company is perceived as a rule-producing activity (cf. Figure 2) that promotes values and creates norms in the organization. With respect to the

disturbances noted in our study, we identified several disturbances that are born from inadequate functioning of corporate management. Therefore, the practices promoted by the company (rules) do not support project management success (object), which may result in RPM. Our data showed that the recruitment of project managers by corporate management may be deficient, leading to incompetent or unmotivated individuals being nominated as project managers. In addition, the data indicated that management may not support the project managers in their job and the project managers' well-being may be neglected. In detail, our disturbance analysis showed that RPM was a consequence when project managers possessed inadequate skills or competencies. (n=21). In these cases, project managers had poor social skills or personal incompetencies. Therefore, the project managers were unsuccessful in leading their projects towards their targets. In addition, the interviewees reported that recruitment failed when project managers were selected using ad hoc-principles or because qualified candidates were not readily available, instead of investing some time in recruitment. RPM was also a consequence when individuals did not want to work as project managers at all (n=6), or they were otherwise unmotivated (n=6). Our interviews revealed that project management as such is a demanding profession, IT-projects are turbulent in nature, and demands for project managers are enormous. The project manager having too much work to do (n=11) relates to the experiences of excessive stress and willfulness to get a better quality of life. As our interviews showed, it is possible that the organization is in such a situation that it is practically impossible for the project manager to do their job; in such a situation, the project managers ease their stress by resigning. One interviewee described her experiences with an organization where the staff opposed the project and refrained from supporting her by concealing required information from her. The following are exemplary extracts from other interviews:

Interview Subject 10: "the person might have overload. You just have to lessen [the workload] and omit projects".

Interview Subject 4: "the particular project manager did not want to take the project in any case. His attitude was very negative. He had too much work when the project was allocated to him".

Questionnaire Response 25: "Lack of support from management".

The following example shows that, in some IT projects, the needed skills may not be known at the beginning of the project, but are revealed during the project. This may result in RPM in order to recruit a qualified project manager:

Interview subject 14: "it means that the results of this particular person are not what was are expected. This is what it means. More about the hard side of this. Incapability that is visible, in fact. If the owner, the owner of the project, does not trust the skills of the project manager or this person in some other way, then the situation is very clear. ... It means that, for example, the background experience of the project manager does not fit to the specific scope of the project. This is what it means. He or she is good at that and that but not in the one specific issue that is extremely important. This may be revealed not until after the project has proceeded some time. Usually it is so that the owners of the project do not know at the beginning of the project what they want from the project manager".

The following example shows that management may promote a talented person to project manager who is not suitable for the job:

Interview Subject 39: "Then the client started to ring that everything is not alright and that the project has not proceeded as expected, the documentation is not

good and so on. When you start to analyze the situation then it was revealed that this so-called project manager was very good technocrat and was grown to project manager, this means that he was, thanks to career development, ended up as project manager but he or she did not have any capability or possibilities to do the job”.

To summarize, there is a structural tension in the relationship between the management AS of a company and the project management AS. The management AS may fail to support project success when recruiting project managers or by not supporting the project managers in their job.

Contradiction 4: Project portfolio management is inconsistent with project management success (rules vs. object)

In a business partnership, collaborating companies share a common goal, yet both aim to financially benefit from the collaboration and, in this case, from the IT project. Providers of IT projects typically organize a project portfolio in order to gain a holistic picture of the project's objective. In project portfolio management, formal or informal business rules (rules) are generated to define, for example, how the project business is organized, how work is allocated and how actors are treated. In an IT project partnership, the project manager has a critical role; therefore, decisions and actions concerning their status and job are made by the project portfolio management and by the client to further their interests. From the disturbances, we identified informal business rules that require the project portfolio management to implement RPM even when the RPM does not directly promote success of the particular project, but the surrounding power plays or business needs dictate. In our interpretation, the following disturbances directly or indirectly relate to the relations between companies and to project portfolio management: project manager is needed in another project (n=17), organizational change (n=3), and client demands the replacement of project manager (n=15). Taking

the viewpoint of the company and its project portfolio, the allocation of project managers is a challenge: the project manager's skills, experience levels, and the significance of the projects all affect this process. From our data, it became evident that a skilled project manager may be transferred to another project. From the viewpoint of the company, it may be perceived more profitable to transfer an experienced project manager to another project, but from the viewpoint of the client, the transfer would be a loss. In such a situation, an informal business rule that requires a project manager to be transferred to a more profitable project is in conflict with the interests of the client. Two examples follow:

Interview Subject 3: "OK, so this project is worth a 100 thousand euros, but then there is another project worth 10 million euros. And we know that the project manager leading the less expensive case is very good and suitable for his job. Therefore, it might be better that we move him or her to lead the more expensive case. This would become such a special situation, which has to be done so smoothly so that the client understands why a successful project manager is being replaced. It requires real talent to explain this".

Interview Subject 9: "Many times you see that the structure of project is changing, a large project is about to end and there are less and less staff in that project, and the same time, new important projects are started. In such a situation, it is sensible to transfer the project manager [from the large project] and allocate a technical leader to manage the project to its end".

Whereas the project manager above is perceived as the profit-maker for the provider company, it may also occur that power play is channeled between organizations through the project manager. In the following example, the client had a controllable project manager, but the provider company made decisions of a stricter control regarding the kind of service to be provided to the client. As a consequence, the client may take

revenge and channel negative feedback by demanding RPM. For the project portfolio management, there is no alternative but to submit to the demands:

Interview Subject 1: "There might be such a typical situation that we from the project portfolio management viewpoint have to set certain objectives for the project manager on how to treat clients. As an example, previously the treatment of clients was too sloppy and work was done for free. But now more assertive attitude towards clients is mandated. Therefore, the project manager will be more assertive, which is exactly what he or she was told to do. Then the client will get anxious and will complain to the project portfolio management, who gets so much pressure and, therefore, decides to replace the project manager. In a situation like this, the project manager is especially wounded. He did his best and did what he or was supposed to do, and because of this the project manager gets kind of bitten by his own dog through the client".

Interview Subject 13: "Then there are demands concerning replacement made by the client. There are chemistry problems or the client believes that they get a more controllable project manager with the replacement. These demands sometimes occur".

To summarize this contradiction, in an IT project business partnership, there are project portfolio management rules that, in practical business situations, require implementing RPM that is not beneficial to the project, but is required by company level business needs or surrounding power play.

4. Discussion

This study contributes to IS and project management literature by revealing four contradictions, structural tensions, that explain the emergence of RPM in IT projects. We used the concepts of contradiction and disturbance from the activity theory (Engeström,

1999a, 1999b; Leont'ev, 1978; Vygotsky, 1978) to analyze perceptions of experienced IT project managers and representatives of senior management on RPM in IT projects. The following contradictions were identified: i) personal life situation becomes inconsistent with the project; ii) style of interpersonal conflict management does not support project success; iii) style of managing and leading organization does not support project management success; and iv) project portfolio management is inconsistent with project management success. The last three contradictions show that in an IT project business, the rules (i.e., informal/formal rules and cultural traditions) develop to a stage that does not support project management success. Each contradiction is discussed as follows.

First contradiction: Personal life situation is inconsistent with project” relates to the tension in the project managers’ individual objectives in their life and the objectives of the project. Both activity systems need each other, but they may have opposite objectives. In fact, when conducting their job, the project manager participates in two activity systems at the same time (poly-motivation), but the objectives concerning both AS become incompatible. As a result of this tension, RPM may occur when the project manager decides to follow their career development plans (e.g., new job) or other life situations (e.g., sick leave), making it impossible to continue as project manager. This finding concurs with Parker and Skitmore (2005) who determined that one of the main causes of turnover is related to career and personal development. According to studies, conflict between work and family life may cause job dissatisfaction, turnover intentions, and stress (Allen 2001; Anderson, Coffey, & Byerly, 2002; Dolcos & Daley, 2009). In addition, intra-personal factors might explain this contradiction. Factors such as self-regard, emotional self-awareness, assertiveness, independence, and self-actualization affect one’s ability to be aware of one’s self, to understand one’s strengths and weaknesses, and to express one’s feelings and thoughts nondestructively (Bar-On 1997; 2006). For example, a project manager with developed independence is able to make decisions

emotionally detached from the point of view of their personal life and targets. Furthermore, a self-actualizing project manager is aware of their possibilities, capabilities, and skills and wants to continually develop. With respect to RPM, many project managers became aware of the inconsistency between what the project job required and what their personal life situation was, and, therefore, left the project (or even the company). This means that project managers had developed intrapersonal factors as they put the decision to leave into practice to attain other goals in life.

Second contradiction: "Style of interpersonal conflict management does not support project success" relates to the behaviors that individuals engage in during interpersonal conflict solving. Based on these disturbances, our interpretation is that interpersonal relations are critical for the success of an IT project in that a positive chemistry will not lead to RPM. The theory of relational dialectics shows that in any human relationship, whether the workplace or romantic involvement, there are constant tensions and opposing values that conflict (Baxter, 1988). In workplace relationships, there are interpersonal and personality conflicts (e.g., Roloff, 1987; Burgoon & Ruffner, 1978). In our results, we found that RPM is a typical solution to chemistry problems in IT projects. However, RPM represents a simplistic and black and white strategy to solving interpersonal conflicts when there are more sophisticated strategies available (Barki & Hartwick, 2001).

Third contradiction: "Style of managing and leading organization does not support project management success" relates to the structural tension in what ideally the management of the corporation should do to support a single IT project to succeed, but, nevertheless, may still fail. The results revealed inadequate functioning of management with respect to recruiting incompetent personnel who are not qualified to manage the project. In our results, it became evident that clients lost trust in the project manager when projects ran late and over budget, resulting in RPM. Similarly, it became evident from the results that

if a project manager was dishonest about the true status of the project, trust was lost and RPM occurred. Whittaker (1999) stated that successful project management is dependent on the project managers' competence. For this reason, the lack of required skills or expertise of both the project manager and the team can contribute to serious budget and schedule overruns. Therefore, our interpretation is that the underlying reason for RPM in IT projects with late schedules and budget overruns was the project manager's incompetence. Many studies identify that the skills and competencies of the project manager are critical to project success (e.g., Crawford, 2005; El Sabaa, 2001; Liikamaa, 2006; Turner & Müller, 2005; Tynjälä, Slotte, Nieminen, Lonka, & Olkinuora, 2006; Tynjälä, Pirhonen, Vartiainen, & Helle, 2009). Identification of those skills in prospective project managers is, therefore, a challenge for the management. Our findings also showed that the needed skills may be revealed as the project proceeds, and RPM may be required in order to recruit a qualified project manager. This is not atypical for IT projects as unclear objectives and changing tack are typical risks in IT projects (Schmidt et al., 2001).

In addition, the results showed that management did not support project managers in their work who became stressed and wanted to leave. This finding agrees with Moore (2000) who found that exhaustion of IT professionals causes turnover in organizations: The strongest contributors to the turnover intention were perceived fairness of rewards, work exhaustion, organizational tenure, and perceived workload. The work exhaustion and workload were reported by our subjects as contributing to their willfulness to leave the project manager's job for a better quality of life. Lock (1998) highlights that, depending on how experienced, competent, enthusiastic, and intelligent a project manager is, they cannot expect to operate effectively independently without adequate support and cooperation. Otherwise, it is likely that stress, along with the intention to leave the project, and perhaps the organization, will increase. Paradoxically, these two

issues of recruiting and supporting project managers are the two main tasks of traditional human resource management (HRM) (Turner, Huemann, & Keegan, 2008), and were revealed to be insufficient in our study.

Fourth contradiction: "Project portfolio management is inconsistent with project management success" relates to balance-seeking in managing the project portfolio of the provider when it affects and is affected by the clients. The project manager's status as a middle-player between the provider and client exposes the project manager to the organizational power play and tensions that are mediated through them. Both organizations aim to benefit – the provider with all the projects in the project portfolio and the client by getting the most out of what the project provider provides. This kind of provider-client relationship is fertile ground for tensions as close organizational relationships lend themselves to this (Fang, Chang, & Peng, 2011). This contradiction shows the project manager's status as a pawn to further the beneficial objectives of partnering companies; it is in the interests of the provider to transfer its staff to projects that further the best interests of the organization. Similarly, the client may pursue their own benefits via a power play that is mediated through the project manager. In our study, using the project manager as a scapegoat emerged, even when the project manager's performance was not poor. More specifically, falsely scapegoating the project manager occurs when organizational objectives collide, and the client aims to channel the power play by finding someone to blame (cf. Schmidt et al., 2001; see scapegoating in Boeker 1992; Mähring, Keil, Mathiassen, & Pries-Heje, 2008). These kinds of structural tensions between the partnering companies may affect the success or failure of IT projects. Although our subjects did not directly discuss this issue in the data, the fact that organizations struggle to succeed in business in the long run (cf. Kerzner 2008) may be in opposition to the goals of individual projects and their successes. Because managers are transferred from projects for reasons other than poor performance, the success of IT

projects may be endangered because of this tension. This of course raises the question of whether the longer-term organizational benefit justifies the decrease of quality in a project.

Implications for research and practice

Developing an IT project business culture

In this study, we have identified four contradictions, three of which concern rules; more specifically, implicit and explicit norms and conventions that relate to changing the object outcome of project management in IT (see Figures 1 and 3). To simplify, there are structural tensions between the rules and the project success of individual IT projects. However, we argue that these contradictions indicate inadequacies in contemporary IT project business cultures because, in many cases, RPM could have been prevented if the rules were more developed (cf. Engeström, 2001). In AT, this is called expansive learning, meaning that the participants are involved in constructing and implementing more advanced, and perhaps radically new, objects and concepts for their activity (Engeström & Sannino, 2010). Theories from organizational culture (e.g., Schein, 1990) and project culture (e.g., Andersen, 2003) would benefit from future research that considers how to prevent RPM and how to deal with RPM occurrences that inevitably occur.

Towards an explanation of the theory of RPM and developing project business culture

Our study concerned IT projects. Although the study by Wirth (1996) identified differences between industries with respect to project management, the study identified similarities as well. Therefore, future research should explore whether the reasons entailed in RPM in other fields are similar or different to those found in this study. This information is vital for developing generic instruments for dealing with RPM. In our study,

social issues were revealed to play a critical role as reasons for RPM (cf. Contradiction 2). Do the same issues matter in construction projects, for example? In addition, triangulation with respect to the investigator, data, and the theory and methodologies used (Denzin & Lincoln, 2000) would offer new insights in the study of RPM (e.g., the use of surveys and quantitative methods).

RPM in IT project management education

The development of IT project business culture by and large begins in the educational institutes where students are exposed to socialization in their future chosen profession (cf. Schein, 1990). We argue that, in addition to the basics of IT project management, the phenomenon of RPM and its underlying reasons should be introduced to future IT project management professionals. An IT project course model reported in Tynjälä et al. (2009) offers a promising solution: during student project roleplaying, the roles of project manager and project secretary rotate every month so that each team member experiences both positions at least once. This means that the students have to plan RPM in their own student project in advance and implement it in practice. Although RPM would be pre-planned, students would have their first experience with RPM, its practical implementation, and its consequences. Further, students would better understand the significance of RPM if they were taught about the underlying reasons for RPM in the business context. Students might even develop solutions for RPM. In addition, some of the issues for developing the IT project business culture could be considered, such as interpersonal conflict management styles (Barki & Hartwick, 2001).

Evaluation

Klein and Myers (1999) defined principles for guiding and assessing interpretive field studies in IS. Although the set of principles are more applicable to in-depth case studies or ethnographies, they can steer the evaluation of other qualitative studies.

In our view, the principle of abstraction and generalization is most applicable to our study. In terms of abstraction, in describing the research design, we reported how the data was collected and analyzed in light of the concept of contradictions in the AT. We described the analysis process to make it visible for the readers. According to our experience, the concept of contradictions in AT steered us to identify a meaningful structure in the subjects' descriptions of RPM. All four contradictions are simplifications to make the underlying reason for RPM clearly visible. Due to the abductive nature of the analysis and the complexity of social realism in IT projects, the contradictions overlap in nature and different interpretations might also be possible (cf. the issue of quality of life emerging in contradictions 1 and 3). In addition, in this research, investigator triangulation played an important role: According to Denzin and Lincoln (2000), investigator triangulation is the use of several different researchers or evaluators in the research process. In this study, there were four individual researchers from three different research disciplines (IS, industrial management, and management and organization). Furthermore, the triangulation of theories was used in this multidisciplinary problem area to gain multiple perspectives for interpreting a single set of data (Denzin & Lincoln, 2000). The use of theories in the analysis process indicates that we conducted theory triangulation. To summarize, the descriptions of four underlying reasons should provide a meaningful and consistent interpretation as they reveal four viewpoints with respect to RPM: private life, interpersonal relations, role of management, and relations between organizations when managing project portfolio. These viewpoints are closely related to each other, but, nevertheless, show four important issues to deal with in future research and practice.

In terms of generalization and given the nature of qualitative study, it is worth mentioning that because the number of subjects is relatively small, the results are not directly generalizable to other contexts. However, the subjects represent considerable

experience in the IT field and both the perspectives of IT project managers and their supervisors are presented in our results. This strengthens the validity of our results. We did not find inconsistencies between the previous study by Anonymous (2007) and our study – rather, our study complements their study. However, the results do not yet represent solidly explain the theory (Gregor, 2006) as our description of contradictions has not been tested with a theory-testing approach.

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(to be added)

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Appendix 1: The process of the literature search

In the literature review, academic journals were collected systematically from the following electronic databases in 2012:

- ACM
- IEEE
- Wiley
- ABI/Inform (ProQuest)
- EBSCOhost
- Elsevier
- Emerald
- Springer Link

The search was executed by using the term "project" and the synonyms "turnover", "replacement", "succession", "displacement", and "dismissal".

Two different searches on *titles* or *abstracts* or *keywords* of the articles were made:

1. "project" AND (turnover OR replacement OR succession OR displacement OR dismissal)
2. "project mana*" AND (turnover OR change OR replacement OR succession OR displacement OR dismissal)

The searches were limited to published “journals” or “scholarly (peer-reviewed) journal”; document type was “article” and “peer review”, and the language was English.

Appendix 2: Subjects of the empirical study

Interview and questionnaire subjects. The six subjects in Phases 4 and 5 are the same, therefore the total n=43.

Table. Summary of the subjects					
Phase of empirical collection	Code of subject	Gender	Type of empirical source	Age	Year
1	1	M	Interview	41	2006
	2	M	Interview	42	2006
	3	F	Interview	42	2006
	4	M	Interview	59	2006
	5	F	Interview	46	2006
	6	F	Interview	57	2006
	7	M	Interview	33	2006
	8	M	Interview	50	2006
	9	M	Interview	38	2006
	10	M	Interview	35	2006
	11	M	Interview	43	2006
	12	M	Interview	41	2006
2	13	M	Interview	47	2009
	14	M	Interview	59	2009
	15	M	Interview	48	2009
	16	M	Interview	51	2009
3	17	M	Interview	37	2009
	18	M	Interview	31	2009
	19	M	Interview	45	2009
	20	M	Interview	37	2009
4	21	M	Questionn.	47	2010
	22	F	Questionn.	44	2010
	23	F	Questionn.	60	2010
	24	M	Questionn.	48	2010

	25	F	Questionn.	46	2010
	26	F	Questionn.	49	2010
	27	F	Questionn.	33	2010
	28	F	Questionn.	58	2010
	29	F	Questionn.	48	2010
	30	F	Questionn.	39	2010
	31	F	Questionn.	34	2010
	32	F	Questionn.	31	2010
	33	F	Questionn.	39	2010
	34	F	Questionn.	43	2010
	35	M	Questionn.	35	2010
	36	F	Questionn.	46	2010
	37	F	Questionn.	N/A	2010
	38	M	Questionn.	48	2010
5	39	F	Interview	46	2010
	40	F	Interview	48	2010
	41	M	Interview	49	2010
	42	F	Interview	40	2010
	43	F	Interview	47	2010
	44	M	Interview	50	2010
6	45	M	Interview	44	2010
	46	M	Interview	42	2010
	47	F	Interview	34	2010
	48	F	Interview	44	2010
7	49	F	Email response	38	2011