Can Anybody Help?

Mitigating IS development project risk with user participation

Master of Science graduation thesis
Industrial Engineering & Management

Bart van Diest

June 28, 2009

Can Anybody Help?

Mitigating IS development project risk with user participation

Master of Science graduation thesis Industrial Engineering & Management

Author:
Bart van Diest
0011223
Industrial Engineering & Management
Information Technology & Management Track
bart@vandiest.eu

Supervisors:
Mrs. Tonny Wildvank
Vice President / Public Sector
Capgemini Nederland B.V.

Dr. Chintan Amrit
School of Management and Governance
University of Twente

Prof. Dr. Jos van Hillegersberg
School of Management and Governance
University of Twente

Colloquium date: July 8, 2009.

SUMMARY

This thesis is about mitigating information system development (IDS) project risk with user participation. The contribution of user participation in ISD projects is endorsed in IS literature, and its application in risk management is described in the research performed by Barki et al. (2001), but a study of the actual application of user participation in risk management could not be found. This thesis set out to investigate the application of user participation in risk management, and therefore, the following research question is formulated:

What user participation mode should be applied in order to mitigate ISD project risk?

Two goals were defined for this research. The first goals was to gain insight in the relationship between user participation modes and project risk factors, and the second goal was to construct a model that can be used to determine how user participation can be successfully applied in ISD projects with a given set of risk factors.

In order to achieve the research goals, and thereby answering the research questions, a research design was constructed. This research design can be divided into two parts; a literature review, which aims to clarify the concept of user participation as part of risk management, and an exploratory research of the application of user participation in practice. For this exploratory research, both a quantitative and qualitative research method were designed in the form of a survey and interviews.

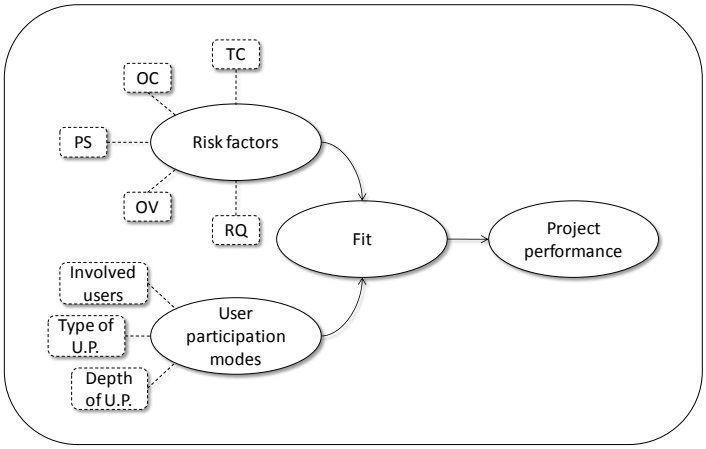

Figure 0.1: Contingency Model of User Participation Modes

Based on the results of the literature review, a conceptual model for user participation as part of risk management was constructed. This model (Figure 0.1) shows the five most prominent risk factors in ISD-projects, and the variables of the user participation modes that can be applied in order to mitigate the risks. For each of the five risk factors, an expected user participation mode is identified using the conceptual model.

An online survey was sent to all Capgemini engagement managers in the Netherlands, and interviews were held with 6 of these engagement managers, the results of which were used to provide an overview of the application of user participation in practice.

THE RELATIONSHIP BETWEEN USER PARTICIPATION AND PROJECT RISK

In order to validate the conceptual model and to provide insight in the relationship between user participation modes and project performance, which was the first goal research goal, the

results of the exploratory research were analyzed and compared with the expected user participation modes identified from the literature. The following results were found:

- The risks that were found in the literature, were also found in a large number of projects examined in the survey and interviews. Most risk factors were present in over half of the projects. The only exception was the risk factor 'project size'; although indicated to be a large and frequently occurring risk, it was only mentioned by a small number of engagement managers as a threat in the projects they mentioned.
- Engagement managers apply user participation in order to mitigate risk. In over 75% of the projects hindered by one of the five risk factors, the engagement managers reported to have applied user participation in order to mitigate the risk. Again, the only exception was found for the risk factor 'project size'. Although based on literature, user participation was expected to mitigate the risk posed by project size, nearly all engagement managers that reported project size as risk factor present in their project, indicated not to have applied user participation to mitigate this. Engagement manager rather resorted to other project management tools and practices for this.
- For all the other risk factors, the expected user participation modes correlated with the results from the survey and interviews. This means that for these four risk factors, the users that were expected to be involved in mitigating the risk, were actually involved by a large number of engagement managers. The expected user participation modes appeared to be a suitable indicator for the behavior of engagement managers.
- Although the expected user participation modes clearly stood out in the survey and interview results, other users than expected were also involved in practice, albeit not in a large number of projects. This does not disprove the fact that the expected user participation modes are a valid generalization of the application of user participation, but it does indicate that there can be reasons to involve certain users in the project, other than those drawn from the literature.

THE SUCCESSFUL APPLICATION OF USER PARTICIPATION IN RISK MITIGATION

The second goal of this research was the construction of a model that can be used to determine how user participation can be successfully applied in ISD-projects with a given set of risk factors.

The results show very little differences in terms of project performance between projects where engagement managers applied user participation to mitigate risks, and hose where they did not. And for the projects where user participation was applied, the differences in applied user participation modes between successful and unsuccessful projects were negligible. This does not mean that there is no relationship between the applied user participation mode and project performance. It does mean, however, that this relationship cannot be explicated with the variables studied in this research. Further research is recommended in order to identify other variables that can explain the relationship between user participation and project performance.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

IS	Information System
ISD	Information System Development
IT	Information Technology
OC	Organizational Complexity
OV	Overambitious Demands
PS	Project Size
R&D	Research and Development
RQ	Incomplete/Unstable Requirements
RUP	Rational Unified Process
TC	Technical Complexity
UP	User Participation
UPM	User Participation Mode

PREFACE

This thesis is the result of eight months of research into IS development project risk mitigation with user participation, and serves as a final assignment for the Master Industrial Engineering & Management (Information Technology & Management track).

The research was carried out at Capgemini Nederland B.V., located in Utrecht, under the supervision of Tonny Wildvank (Vice-president at Capgemini), Chintan Amrit (University of Twente) and Jos van Hillegersberg (University of Twente).

My personal goal for this research was twofold; on the one hand, I aimed at constructing a model that would benefit IT professionals and would contribute to the scientific understanding of the application of user participation. On the other hand, I wanted to gain experience in conducting a structured scientific research. Therefore, you will find that this thesis has a strong focus on methodology.

There are many people who helped and supported me during my graduation project, to whom I owe much gratitude. First of all, I would like to thank Tonny Wildvank, for giving me the opportunity to carry out my research at Capgemini, for supporting me during the research and for introducing me into the wonders and secrets of IT consulting. I would also like to thank Chintan Amrit and Jos van Hillegersberg for their support during the writing of my thesis and for providing the structure I sometimes lost during the process. Furthermore, I would like to thank all the engagement managers at Capgemini who participated in the survey and interviews, for their time and valuable information. And last but not least, I would like to thank my family and friends, for their help and support to finish my thesis, their inspiring conversations and advice, their encouragements to stay focused and the occasional, much appreciated distraction.

Bart van Diest
Utrecht, June 2009

Chapter 1

1 RESEARCH CONTEXT

This chapter provides an introduction to the thesis and the backgrounds of the research field. The company where the research was carried out is introduced, and the thesis structure is explained.

1.1 INTRODUCTION

This thesis is about "*mitigating information system development project risk with user participation*". Information system development (ISD) in this thesis is considered from an IT consultants point of view, and the topic of this thesis can therefore be translated as: "*involving people from the client organization, who will be working with the new information system (IS) - either directly or indirectly - in the development process of this IS in order to reduce the chance of failure of the development project.*" Both user participation and ISD project risk have received a lot of attention in IS literature over the years, but they are seldom combined in order to see how one can reduce the other. This is exactly what is studied in the research that is described in this thesis.

The goal of this research is twofold; the first objective is to gain insight in the relationship between ISD project risk and user participation, the second objective is to see how user participation should be applied to successfully mitigate ISD project risk. Before describing the research that was carried out to accomplish these objectives, the context of the research will first be described in this chapter. In paragraph 1.2, the research filed will be introduced, followed by an overview of Capgemini in paragraph 1.3. Finally, in paragraph 1.4, the structure of this thesis is shown.

1.2 RESEARCH FIELD

In today's fast moving economy, the role of ISs has become ever more important and will become even more so in the future. Since the emergence of simple business applications in the early 60's, ISs have transformed into complex systems, often covering entire organizations, or even creating inter-organizational networks. Since the increasing complexity heavily influences the practice of ISD, dealing with the complexity has been a widely research topic in IS literature,

and has also received much attention in practice. This does not alter the fact that ISD is still plagued by setbacks.

An extensive research conducted in 2003 by the Standish Group, showed that 51% of ISD projects were challenged (meaning: too late, over budget and/or not meeting requirements), and 15% resulted in a total failure (*CHAOS Chronicles*, 2003). Although this was an improvement compared to the results of the same research conducted in 2000 (*Extreme Chaos*, 2001), it clearly indicates that success in ISD should not be taken for granted.

Fortunately, a great deal of research has been done on what causes these high rates of failure and on how they can be prevented. One of the most important causes for failure found in these researches is the lack of user participation in ISD projects (*CHAOS Chronicles*, 2003; He & King, 2008; Ives & Olson, 1984).

User participation can be defined as the "participation in the system development process by representatives of the target user group" (Ives & Olson, 1984, p. 587) and is extensively covered in IS literature (Garrity, 1963; King & Cleland, 1971; Steinbart & Accola, 1994). In fact, Hwang & Thorn (1999) even state that it is the most widely discussed topic in IS literature. One might expect that all this research had resulted in a clear understanding of the concept of user participation, its application and its results, but unfortunately, this is not the case; studies on the effect of user participation on system outcomes are inconclusive and often contradicting (Ives & Olson, 1984; Lynch & Gregor, 2004), and the issues of when user participation should be applied and how user participation should be organized, are often vaguely covered and predominantly separately in different articles.

In this research, the available literature will be reviewed in order to create a clear and practical model that can be used to determine when user participation should be applied, how user participation should be applied, and what results can be expected from the application of user participation.

1.3 CAPGEMINI

The research was carried out at Capgemini Netherlands in Utrecht. Capgemini is a company that operates worldwide in the markets for consulting, technology and outsourcing. It has over 80.000 employees working in over 30 countries.

Capgemini is divided into 4 sectors (Public, Products, Transport, Telecom & Utilities and Financial Services) that operate in 3 disciplines (Technology, Consulting and Outsourcing), as is shown in Figure 1.1. Although working from a technology department in the public sector, departments from all sectors and disciplines were involved in this research.

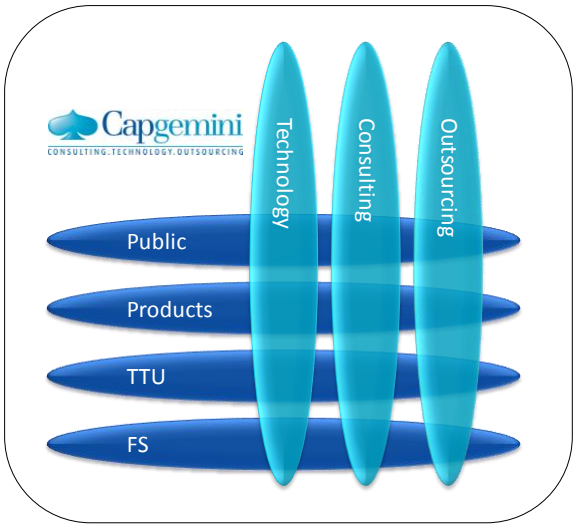

Figure 1.1: Company structure of Capgemini

This research focused on project management, and at Capgemini, projects are managed by engagement managers. Capgemini operates 4 certification levels for engagement managers, with a level 1 engagement manager being certified for projects up to 15 project members and a budget up to €2.5 million, and a level 4 engagement manager being certified for projects over 100 members and €30 million. For this research, only level 1, 2 and 3 engagement managers participated in the survey and interviews.

1.4 THESIS STRUCTURE

This paragraph will provide a short overview of the structure of this thesis. The thesis can be divided into four sections, which will be discussed here one by one.

In the problem analysis & research questions chapter, the research is set up. The research field and background are explained by means of an overview of IS literature on this topic. From this overview, the main research problem is identified and the goals for this research are set. Finally, the research question and sub-questions are formulated.

The research methodology that is used to achieve the research goals is presented in chapter 3. First, the selection of the methodologies is explained, followed by an overview of the different methodologies used in this research. Although a short literature review is carried out in chapter 1 and 2, an elaborate literature review is conducted as part of the research methodology. The design of this literature review method is explained in this chapter, together with the survey and interview design.

Chapter 4 presents the results of the literature review, the survey and the interviews. The conceptual model designed for this research is presented and validated using the survey and interview results. These findings are discussed and finally, an overview of the research limitations is provided.

Based on the results and discussion presented in chapter 4, new research topics and ways to extend this research are presented in the final chapter ‘recommendations for further research’.

Chapter 2

2 PROBLEM ANALYSIS & RESEARCH QUESTIONS

This chapter will discuss the main problem that this research sets out to solve, but before analyzing this problem, some more information on the research topic will be provided. In paragraph 2.1, the theoretical background of user participation is discussed, followed by a discussion of user participation as part of risk management in paragraph 2.2. Because in this thesis, the Rational Unified Process is used to define ISD-projects, a short introduction of this development process is given in paragraph 2.3. Paragraph 2.4 deals with the problem analysis, and will present the main research question and research goals.

2.1 RESEARCH BACKGROUND

As mentioned earlier, numerous articles are written on the topic of user participation. A simple search in IS literature returns literally thousands of hits. Despite the large amount of literature, the topic is still surrounded by controversy and lack of clarity, starting with the definition.

In IS literature, two definitions are used, often, but not always meaning the same concept; *user involvement* and *user participation*. For the sake of clarity, Barki & Hartwick (1989) make a distinction between these concepts by providing definitions for both. According to these definitions, *user involvement* refers to "a subjective psychological state reflecting the importance and personal relevance of a system to the user", whereas *user participation* refers to "a set of behaviors or activities performed by the user in the system development process". This research will use the distinction between the two concepts, as is proposed by Barki & Hartwick, and will focus on the latter; user participation.

A second subject of controversy and vagueness, is the application of user participation in ISD. In this perspective, the methods of application determine *who* should participate and *how* user participation should be applied. First, the 'who' question;

It is noticeable that a great number of authors don't pay attention to this question (Choe, 1998; Hsu, Chan, Liu, & Chen, 2008; Yetton, Martin, Sharma, & Johnston, 2000). Those who do, fail to reach agreement. The answers to this question vary for the proposed methods, from involving only a few expert users (Hwang & Thorn, 1999), to involving all stakeholders of the new IS (Doll & Deng, 1999).

The 'how' question refers to the phases of the ISD process in which users should participate, and the role of the participating users in these phases (Lin & Shao, 2000; Lynch & Gregor, 2004). For both issues, the suggestions given by authors diverge. Some authors, like Yetton et al. (2000), suggest that users should participate in the requirement phase, so they have a large influence on the functionality of the system. Other authors, like Hsu et al. (2008), suggest that users should participate in reviewing the system, so that they can check the systems usability and indicate whether the system meets the expectations. Choe (1998) thinks that users should not participates in the technical phases, because their lack of technical know-how can only impair the process, while other authors suggest that users should participate in all project phases in order to maximize the user satisfaction (Lin & Shao, 2000; Lynch & Gregor, 2004).

Finally, there seems to be disagreement on the results of user participation in ISD projects. Researchers find different results (Brodbeck, 2001; He & King, 2008; Heinbokel, Sonnentag, Frese, Stolte, & Brodbeck, 1996; Ives & Olson, 1984; McKeen, Guimaraes, & Wetherbe, 1994), and, although most are positive, there is still a lack of consistent empirical data to support these claims (Gallivan & Keil, 2003). Saleem even states that:

"…it is intuitively appealing that user participation leads to system success, however, the empirical evidence on the merits of user participation has as much clarity as would a law of gravity stating that a falling object may sometimes come down, occasionally go up, and periodically drift to the side" (Saleem, 1996, p. 145).

These findings are not completely surprising, given the disagreement on definition and application of user participation.

2.2 USER PARTICIPATION AS PART OF RISK MANAGEMENT

In their attempt to develop an integrative contingency model for software project risk management, Barki et al. (2001) identified user participation as one of the three key dimensions of a risk management profile, the other being formal planning and internal integration. They have shown that a better fit between the level of risk exposure of a software project and its management profile will result in a higher project performance. The relationship between risk exposure, management profile and project performance is depicted in Figure 2.1.

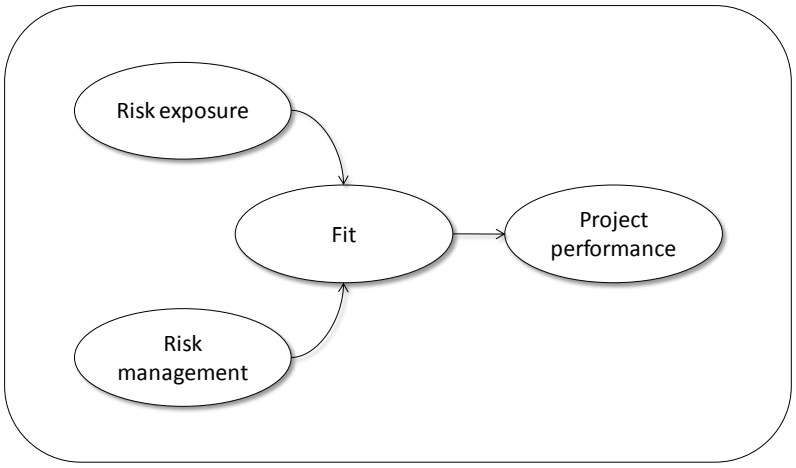

Figure 2.1: General Contingency Model of Software Project Risk Management (H. Barki, et al., 2001)

Although the model of Barki et al. is a clear and intuitively appealing model, it has some limitations; First of all, the variable 'risk exposure' is shown as a cumulative score that is distilled from all risks present in the project. The score itself only presents the result of these risks in terms of costs and cannot tell anything about the risks that are present in a project (it is possible to calculate the risk exposure score from the risks present in the project, but it is impossible to tell something about the individual risks based on the risk exposure score).

Secondly, the key dimensions of risk management are not studied in depth. The model simply assigns a single score to each of the dimensions (e.g. user participation can be 'high' for a certain project). By doing so in the determination of an optimal fit, attention is paid to the intensity of user participation, formal planning and internal integration, but how these intensities are achieved, is not studied.

Third, the fit between risk exposure and the dimensions of risk management are only formulated as: "for a certain level of risk exposure, a certain level of risk management will result in optimal project performance". The model does not provide information about this fit on a more detailed level; that of the individual risk factors and risk management dimensions. Because of this limitation, the model is too abstract to base decisions on.

Barki et al. have shown the importance of a fit between project risk management and risk exposure, and by considering user participation to be a key dimension in project risk management, the relationship between the risk exposure – user participation fit and project performance is also implicitly assumed.

This research will take the model of Barki et al. as point of departure and will focus on the relationship between the risk exposure – user participation fit and project performance. By doing so, the limitations of the model proposed by Barki et al. will be studied in detail.

Figure 2.2 shows the contingency model of Barki et al. again, but this time, the model is limited to the scope of this research; instead of taking the entire risk management construct into consideration, only the user participation mode dimension is show. The risk exposure construct is also more concrete in the new model; Barki et al. state that risk exposure equals the probability of occurrence multiplied by the costs of occurrence, accumulated for all risk possible

forms of risk. This research will look at the separate risk factors in detail, in order to find out how user participation can be used to mitigate the risk.

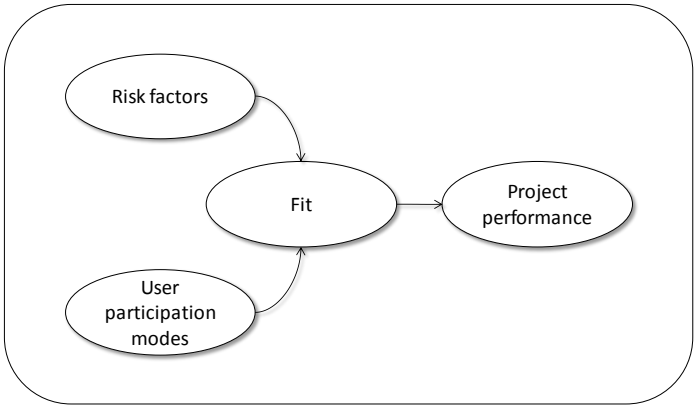

Figure 2.2: Contingency Model of User Participation Modes

The modified contingency model shown in Figure 2.2 is the model that will be used as the central research model in this research. The model will be extended and discussed further in paragraph 4.1.3.

2.3 THE RATIONAL UNIFIED PROCESS

Capgemini strives to apply one standard development process to all its (IS) development projects. The method chosen by Capgemini is the Rational Unified Process, or RUP for short. Rup is a software development process framework, which is developed to help managing a development project. RUP is not a rigid method, but rather a flexible framework that can be adapted to suit a project. It is neither a linear method, nor is it a fully iterative method; it is a combination of both. On the high level, RUP uses four phases to present a project, as if it were a waterfall method. Within these phases, work is done in a iterative way (Kruchten, 2004).

Figure 2.3 shows the four phases of RUP, and the disciplines and iterations that take place inside these phases. The four phases are described below.

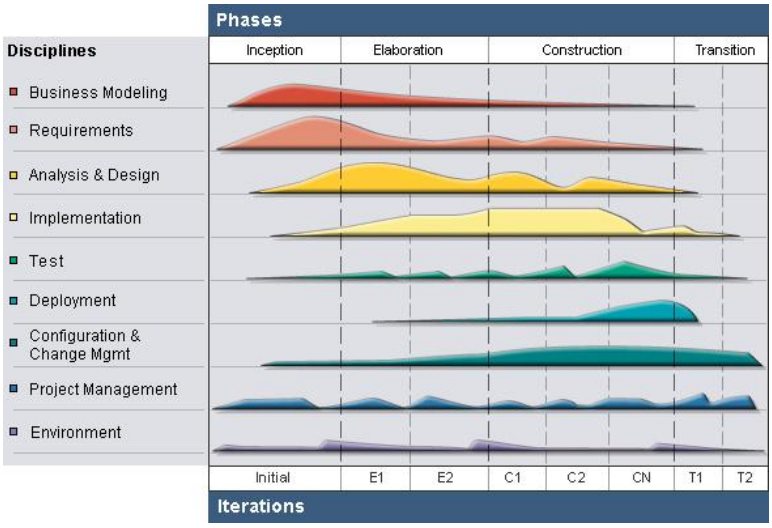

Figure 2.3: RUP phases, disciplines and iterations (Kruchten, 2004)

INCEPTION PHASE

In the inception phase, the project is initiated. Agreements are made with the customers and other stakeholders about the scope of the project, and the feasibility and boundaries are determined. Also, in the phase, a risk analysis is performed. The phase ends with a go/no go decision and a business case.

ELABORATION PHASE

The elaboration phase is the phase in which most of the functional requirements are specified and the architecture of the IS is designed. The result of the elaboration phase is a project plan with detailed specification of the IS and a proof of concept for the architecture.

CONSTRUCTION PHASE

In this phase, the actual building of the IS takes place. The phase is completed when the IS has all required functionality, is fully tested and ready to be implemented

TRANSITION PHASE

In this final phase, the organization is prepared to receive the IS and the system is deployed. Employees are trained to work with the IS and the project is evaluated.

Although not all projects use RUP, the phases mentioned above can be used to describe the project state of nearly all ISD projects. Therefore, these phases will be used throughout this thesis to describe the state of a project.

2.4 RESEARCH QUESTIONS AND GOALS

From the previous paragraphs, it becomes clear that a lot of issues about user participation are unclear, unknown or contradicting. A clear and orderly overview of all considerations involved in applying user participation in ISD projects is lacking. The problems, as mentioned in paragraph 2.1 can be summarized as:

- It is unclear which users should be participating in ISD projects;
- It is unclear in what phase(s) of the ISD projects users should participate;
- It is unclear what the role of the participating users should be.

When considering the model shown in Figure 2.2, these problems all refer to the User Participation Modes. Therefore, the problems can be combined in the following problem statement:

- It is unclear what *user participation mode* should be used in ISD projects.

Unfortunately, there is no unambiguous solution to this problem, as is already described in paragraph 2.1; the selection of a user participation mode depends on different contingency factors of the ISD project at hand, and since this research focuses on risk factors, it is important to identify these risk factors and to identify which user participation mode is most suitable for a given set of risk factors. The ultimate goal of user participation in ISD projects is to increase project success. The central problem definition can therefore be formulated as:

PROBLEM DEFINITION

There is no clear overview of the relationship between project risk factors and user participation modes and its effect on project performance.

2.5 RESEARCH GOALS

The problem described in the previous section is a knowledge problem; solving it will not "change the world", but will provide knowledge on "how the world works" (Heerkens, 2001). Since this research aims to solve the problem stated above, the main goal is to provide knowledge on how the concept of user participation works. In order to do so, the first research goal can be formulated:

FIRST RESEARCH GOAL

Gain insight in the relationship between user participation modes and project risk factors, and its effect on project performance

This knowledge will be provided in the form of a model that can be used by professionals to determine what user participation mode is suitable for their ISD project. The second goal of this research can therefore be formulated:

SECOND RESEARCH GOAL

Construct a model that can be used to determine how user participation can be successfully applied in ISD projects with a given set of project risk factors.

2.5.1 RESEARCH QUESTION AND OBJECTIVES

In order to fulfill the research goals stated in the previous section, the following research question is formulated:

RESEARCH QUESTION

What user participation mode should be applied in order to mitigate ISD project risk?

The research question consists of 4 important constructs, which correspond to the constructs of the central research model: user participation modes and project risk factors, the relationship between both, and the effect of this relationship on project performance. For each of these constructs, a sub-question is formulated.

SUB-QUESTION

- *What are the possible user participation modes?*
    - *What users from the client organization should participate?*
    - *In what project phase should the users participate?*
    - *What should be the role of the participating users in the project organization?*
- *What are the possible risk factors in ISD-projects?*
- *What is the relationship between user participation modes and project risk factors?*
- *How does this relationship affect project performance?*

2.5.2 IMPROVEMENT OF THEORETICAL UNDERSTANDING

Theory on user participation lacks clarity on several aspects, as mentioned in the introduction. Briefly, IS literature explains why user participation is important, but fails to explain clearly how user participation should be applied. This how-aspect will be addressed in this research. Literature on user participation will be reviewed and all different approaches will be combined into one clear model. Doing this will create a broader understanding on the principle of user participation and its influences on IS development projects.

2.5.3 PRACTICAL IMPLICATIONS

Despite the absence of clarity on the usage of user participation in IS literature, the concept is being used in practice. Many of the decisions mentioned in the introduction, are made by professionals based on experience and best practice. There exists, however, no formalize approach that can be used to justify the decisions and to measure its impact. This research will provide a decision support model that identifies the appropriate mode of user participation for a given project, so that it becomes a formalized and measurable approach, rather than one based on non-transferrable experiences.

Chapter 3

3 METHODOLOGY

In order to test the theoretical model introduced in the previous chapter and, by doing so, answer the research questions, a research methodology is constructed in this chapter.

3.1 METHODOLOGICAL PLURALISM

Mingers (2001) defines a research methodology as "*a structured set of guidelines or activities to assist in generating valid and reliable research results. It will often consist of various methods or techniques […]"*. He defines a research method, which is part of a research methodology, as an *"instrument for provoking a response from the world."* This means that the response provoked by the instrument depends on both the instrument and the world. Mingers therefore promotes the usage of multiple methods to provoke responses from the same world. By doing this, he states, the results of the research will be richer and more reliable. This concept is referred to as methodological pluralism.

Mingers defines several types of multimethod research designs, of which a combination of two types is used in this research; the sequential design and the parallel design. This is illustrated in Figure 3.1.

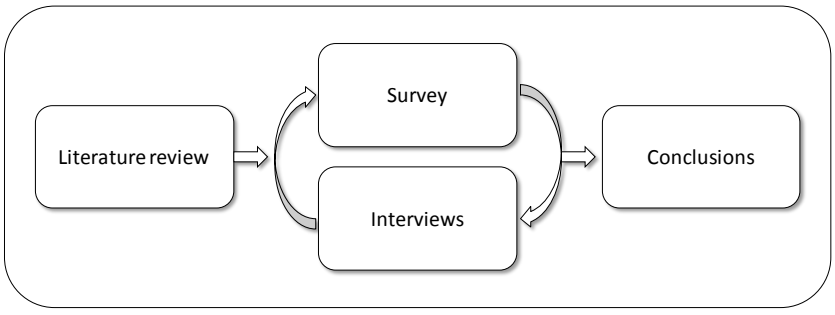

Figure 3.1: Multimethod Research Design

For this research, three different methods are selected; a literature review, a survey and an interview. First, the contingency model introduced in chapter 2.2 is operationalized by adding variables which are obtained using a literature review. The resulting operationalized model is used to assess the application of user participation in practice. For this, interviews and a survey

are carried out in parallel, with results feeding into each other. Besides assessing the application of user participation, the interviews and survey are also used to test the theoretical model.

Of course, a researcher has more research methods at his disposal than the ones mentioned above. The three methods used for this research are the results of a method selection process, which will be described in paragraph 3.2. The literature review is described in paragraph 3.3, the survey design in paragraph 3.4 and finally, in paragraph 3.5, the design of the interviews and the processing of the interview results are described.

3.2 SELECTION OF METHODS

The choice for the three research methods mentioned above is the result of a selection process. For this selection process, all available research methods are classified by the use of eight descriptors (Cooper & Schindler, 2003). Based on these descriptors, an appropriate research method for this research will be selected below.

DEGREE OF RESEARCH QUESTION CRYSTALLIZATION

In this category, there are two possibilities; a research can either be exploratory or formal. Exploratory studies are often loosely structured studies that seek to develop hypotheses or questions for further research. Formal researches are much more structured and seek to answer the questions and/or test the hypotheses resulting from exploratory research.

For this study, the exploratory research has taken place in chapter 2; in this chapter, the research questions are constructed based on the loosely structured literature review and informal conversations. But, with this exploratory part considered as preliminary research, the actual research (i.e. the part that seeks to find answers to the questions formulated in chapter 2) can be categorized as formal research.

METHOD OF DATA COLLECTION

This category determines whether the researcher requires a response from anyone, or whether he can simply inspect activities or the nature of materials. The former option is called interrogation or communication, the latter is called monitoring.

Since this research seeks to find answers to the research questions about the usage of user participation in real life, it classifies as an interrogation/communication research.

RESEARCHER CONTROL OF VARIABLES

This category refers to the researcher's power to manipulate certain variables in the research setting. In experimental studies, the researcher can (and will) manipulate certain variables in order to discover the effect of these manipulations. In ex post facto studies, the researcher has no control over the variables and he can only monitor what happens. The researcher has a passive role instead of the passive role he has in experimental research.

For this research, manipulating variables will be quite impossible. First of all, the research investigates real-life projects. Manipulating variables in these multi-million Euro projects just for the sake of research, and without knowing exactly what will happen, might result in unacceptable high costs and risk of project failure. Besides that, this research will also investigate projects that are finished, in which case the manipulation of variables is, of course, impossible.

THE PURPOSE OF THE STUDY

Researches can be descriptive or causal. Descriptive researches seek to find out *who, what, where, when* or *how much*, while causal researches try to find out *why* something happens, how a certain variables influences another.

The main part of this research can be categorized as descriptive. It tries to find out *what* the best fit is between risk factors and user participation modes. Besides describing the fit, this research also tries to find out what determines this fit, i.e. *why* a particular combination between risk factors and user participation modes is better that the other. This part of the research can be categorized as causal.

THE TIME DIMENSION

A research can be cross-sectional or longitudinal. Cross-sectional research looks at data from a phenomenon at one moment in time, while longitudinal researches are repeated over time in order to track changes over time.

Since the projects studied by this research often run for over a year, and this research is limited in time, it is impossible to study the projects from start to finish. Therefore, a cross-sectional research is chosen. However, in order to reveal some of the benefits from longitudinal research, questions about the history and the future expectations of the research are included.

THE TOPICAL SCOPE

Research methods can be divided into quantitative methods (designed for breadth rather than depth) and qualitative methods (designed for depth rather than for breadth). Quantitative methods are good for answering questions like *what is happening*, while qualitative methods are useful for answering questions like *why is this happening*.

Since this research is seeking to answer both *what* and *why* questions, a combination of quantitative and qualitative research methods is used.

THE RESEARCH ENVIRONMENT

Research can be conducted under actual (field) settings, or under laboratory settings, simulating the actual settings, but controlling or manipulating one or more conditions. Since ISD projects are highly complex projects, influenced by numerous external factors (some of which are not fully known or understood), staging a laboratory setting will be virtually impossible, not

mentioning the costs of such an operation. Obviously, the field setting will be the most suitable setting under which this research is conducted.

PARTICIPANTS' PERCEPTION

This descriptor refers to whether the participants of the research are aware of the research and perceives a deviation from everyday routines. Since this research will investigate projects that are already finished, the research will obviously have no effect on the projects.

3.2.1 SELECTION

Based on the classifications described above, a proper research method is chosen for this research. This should be a formal method that relies on data that is collected through interrogations and communication. The research takes place in a field setting, in which variables cannot be controlled or manipulated. The research is a cross-sectional study, but it will also encompass history and future expectations. For finding the relations between risk factors and user participation modes, and for the validation of the model, a descriptive and statistical research method is used, while for the investigation of the context of user participation in ISD projects, a causal and case study based method is used. This means that in this research, a combination of quantitative and qualitative methods is used.

The qualitative research methods used here, are a literature review and interviews, while the quantitative data is gathered using a survey. The aim of the literature review is to operationalize the contingency model presented in paragraph 2.2 by identifying what risk factors can be mitigated with user participation and by identifying the possible user participation modes. With this information, the expected user participation mode for each risk factor will be identified.

The interviews and survey are held to gather information about the application of user participation in practice. The survey and interviews were held with engagement managers (project managers) at Capgemini, since they are responsible for the management of ISD project and thus responsible for the application of user participation.

3.3 LITERATURE REVIEW EXPLAINED

The first methodology that is used in this research, is the literature review. The main goal of this literature review is to find information about user participation as dimension of risk management from IS literature. A literature review is a helpful method for creating 'a firm foundation for advancing knowledge' (Webster & Watson, 2002, p. XIII).

This paragraph will explain how the literature review was conducted. Section 3.3.1 explains the search process for articles, section 3.3.2 explains how the useful articles were selected and in section 3.3.3, the synthesizing of articles is explained. The results of the literature review are presented in chapter 4.

3.3.1 SEARCHING ARTICLES

In this first stage of the literature review, (online) databases are searched in order to build a base collection of articles that are used further along in this literature review. Search criteria and key words are defined and a suitable search engine is chosen. A search query is entered and finally, the results are shown.

GOALS OF THE FIRST STAGE

As described in section 3.2.1, the literature review aims to operationalize the main research model by identifying risk factors and possible user participation modes, after which the expected user participation modes for each risk factor are identified. Referring to the research questions formulated in chapter 2, the following sub-questions are answered in the literature review:

- *What are the possible user participation modes?*
- *What are the possible risk factors in ISS-projects?*
- *What is the relationship between user participation modes and project risk factors?*

The first two questions are answered using a structured literature review. Based on these findings, the last question can be answered. Figure 3.2 shows what variables in the main research model are dealt with in the literature review.

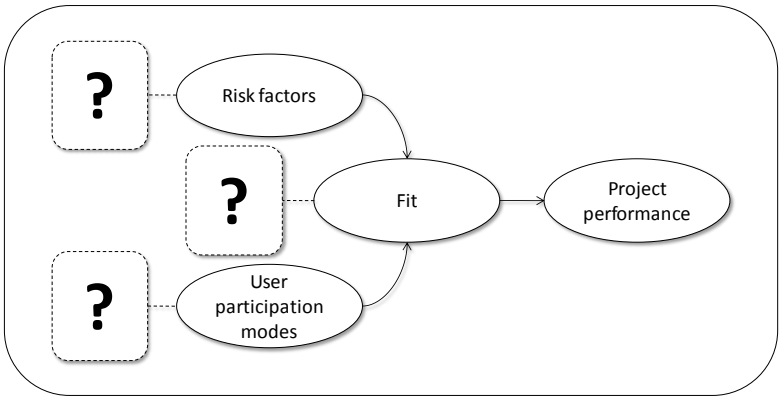

Figure 3.2: Goal of the literature review

SELECTION CRITERIA

The main selection criterion used in this stage obviously concerns the articles' relevance to the research questions. Besides that, additional criteria are formulated:

- Only articles of high scientific importance are selected for this review. Therefore, only articles that are published in one of the top 25 IS journals are included (Schwartz & Russo, 2004). The IS journal ranking was retrieved from IsWorld (Saunders, 2008);
- Due to the dynamic nature of the research field, only contemporary articles, i.e. articles published over the past 10 years, are included;

- Only influential articles are selected for this review. Articles must be cited at least 5 times, except for articles published in 2007 and 2008; for these younger articles, no citation criterion is used.

SELECTION OF SEARCH ENGINE

There are numerous online search engines available that can be used to find scientific literature. Not all of these search engines are suitable for searching within the top 25 IS journals. In fact, not a single one of them covers all top 25 IS journals. Of the search engines that cover most of them, Scopus was selected for this review because of its ease of use. Scopus covers 24 of the top 25 IS journals. Only the Communications of AIS is not covered and is therefore hand-searched.

SELECTION OF KEYWORDS

Because the base collection of articles aims to answer more than one question, the keywords that are chosen for the search query are rather broad. Although this research focuses on user participation and not on user involvement, both “user participation” and “user involvement” are used as keywords. This is done because the term “user involvement” is often used when talking about “user participation”, as defined by Barki & Hartwick (1994). These keywords, combined with the first selection criterion resulted in the following query:

```
TITLE-ABS-KEY
((user involvement) OR
(user participation))
 AND
(LIMIT-TO(EXACTSRCTITLE, "MIS Quarterly Management Information Systems") OR
LIMIT-TO(EXACTSRCTITLE, "Information Systems Research") OR
LIMIT-TO(EXACTSRCTITLE, "Communications of the ACM") OR
LIMIT-TO(EXACTSRCTITLE, "Management Science") OR
LIMIT-TO(EXACTSRCTITLE, "Journal of Management Information Systems") OR
LIMIT-TO(EXACTSRCTITLE, "Artificial Intelligence") OR
LIMIT-TO(EXACTSRCTITLE, "Decision Science") OR
LIMIT-TO(EXACTSRCTITLE, "Harvard Business Review") OR
LIMIT-TO(EXACTSRCTITLE, "IEEE Transactions") OR
LIMIT-TO(EXACTSRCTITLE, "AI Magazine") OR
LIMIT-TO(EXACTSRCTITLE, "European Journal of Information Systems") OR
LIMIT-TO(EXACTSRCTITLE, "Decision Support Systems") OR
LIMIT-TO(EXACTSRCTITLE, "IEEE Software") OR
LIMIT-TO(EXACTSRCTITLE, "Information and Management") OR
LIMIT-TO(EXACTSRCTITLE, "ACM Transactions on Database Systems") OR
LIMIT-TO(EXACTSRCTITLE, "Journal of Computer and System Sciences") OR
LIMIT-TO(EXACTSRCTITLE, "Sloan Management Review") OR
LIMIT-TO(EXACTSRCTITLE, "ACM Computing Surveys") OR
LIMIT-TO(EXACTSRCTITLE, "Academy of Management Journal") OR
LIMIT-TO(EXACTSRCTITLE, "International Journal of Electronic Commerce") OR
LIMIT-TO(EXACTSRCTITLE, "Information Systems Frontiers") OR
LIMIT-TO(EXACTSRCTITLE, "Journal of Management Systems") OR
LIMIT-TO(EXACTSRCTITLE, "Organization Science") OR
LIMIT-TO(EXACTSRCTITLE, "IEEE Computer") OR
LIMIT-TO(EXACTSRCTITLE, "Information Systems Journal"))
```

Figure 3.3: Search query for Scopus

BASE COLLECTION OF ARTICLES

The search query shown in Figure 3.3 was entered into Scopus on October 7th, 2008, and returned 131 articles. After applying the remaining search criteria, 54 articles remained (see Figure 3.4). These articles make up the base collection.

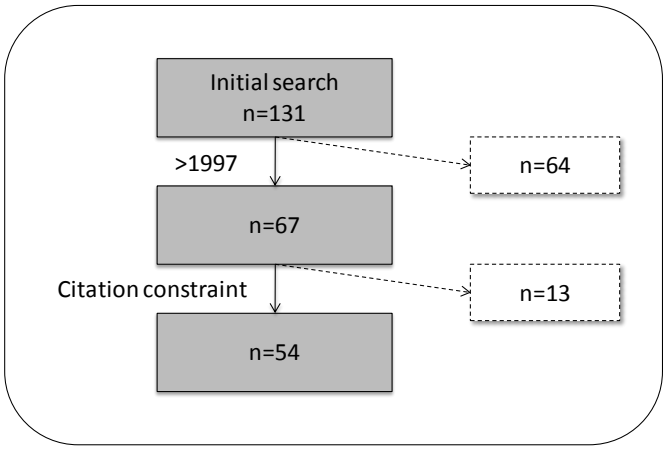

Figure 3.4: Application of search criteria

3.3.2 SELECTING ARTICLES

Having identified a base collection of articles, these articles are then reviewed for each of the first two research questions. First, a rough selection of articles is made, based on the articles' abstracts. After this, the selection is refined by reading the selected articles. The selection process and the resulting numbers of articles are shown in Figure 3.5. The next sections discuss the synthesizing of these articles.

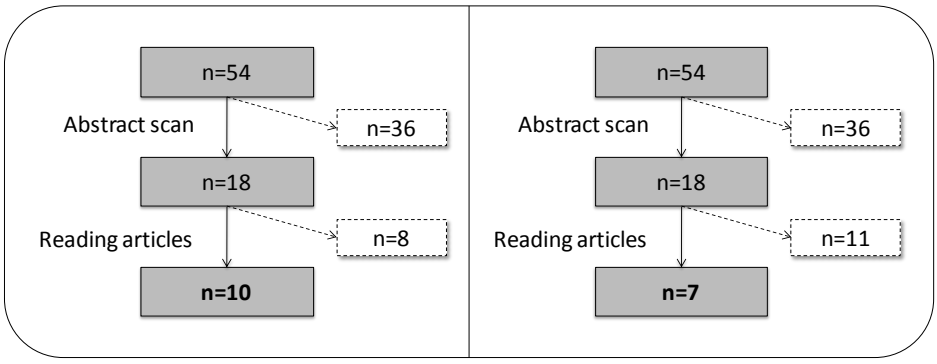

Figure 3.5: Selection of articles

3.3.3 SYNTHESIZING ARTICLES

Synthesis is "*the combining of often diverse conceptions into a coherent whole*" ("synthesis," 2008). The previous section dealt with searching and selecting articles that are relevant to the research topics. This section will look at what is said in those articles about the topics. One way of doing this is by summarizing the articles, stating that 'author A said this' and 'author B said that'. This author-centric approach fails to synthesize the articles. In order to provide a 'coherent

whole', a concept-centric approach is required (Webster & Watson, 2002). In a concept-centric approach, after reading the articles, the major themes (concepts) emerging from the articles are identified. The articles are then categorized in sets with similar themes. This is done by drawing a concept matrix, mapping the concepts to the articles (Webster & Watson, 2002). The final synthesis is done by discussing all concepts using an inductive approach (Suri & Clarke, 1999).

3.4 SURVEY DESIGN

The main objective of the survey is to gain insight in the relationships between user participation, risk factors and project performance. This insight is based on projects executed by Capgemini. There are different types of surveys, and many decisions to be made while designing a questionnaire. As guideline for the design off this survey, the procedure proposed by Kidder (1981) is used.

First of all, it is important to decide what information is to be sought by the survey. Considering the research questions formulated in chapter 2, the following questions are regarded by the survey:

- What risks were present in a project?
- What user participation mode was used in order to mitigate the risk?
    - What persons from the client organization were involved?
    - In what project phase were they involved?
    - What role did they fulfill?
- What were the results of the project?

In order to find answers to these questions, a self-administered questionnaire was created using the online survey-tool Limesuvey. The usage of such an online tool has many benefits. It allows for a fast and cheap distribution of the questionnaires. The questionnaire is designed and store online and the participants are invited via email. Limesurvey allows for personification of the invitations and surveys and adds a unique token to each invitation, so that it can monitor who has completed the survey and who has not. Reminders can be sent automatically to those participants who have not finished the survey. Limesurvey also allows for skip-logic and conditional questions (e.g. question 2 only appears if the respondent answered 'yes' to question 1), making the questionnaire look as short and structured as possible.

3.4.1 DESIGN

Because the engagement managers have often managed numerous projects, and it is impossible to take them all in consideration, the questionnaire only asks for extreme projects. The participation engagement managers are asked to think of two projects they managed as engagement manager; the project they think of as most successful and the project they think of as least successful in terms of budget, planning and delivered functionality. For both projects, the participants are asked per risk factor, whether the risk factor was present in the project, whether they involved users from the client organization in the project in order to mitigate this risk, and, if so, what users they involved in the project.

As mentioned in section 2.3, RUP is used as standard methodology at Capgemini. This does not mean that all projects are managed according to RUP. Therefore, the participants are asked whether the projects they mentioned were managed according to RUP or another methodology. In case of RUP projects, the participants are asked in which of the four RUP-phases (inception, elaboration, construction and transformation) they involved the users from the client organization.

Since there are many more methodologies besides RUP, most of which have their own phases, the survey makes no distinction between phases for non-RUP projects and the participants are only asked what users they involved in the project.

In order to prevent the questionnaire from becoming to lengthy, the roles of the participating users in the projects are not taken into consideration. This part of the user participation mode construct is dealt with only in the interviews.

3.4.2 TESTING

Based on the design described above, a draft version of the questionnaire was created. This draft was tested twice for errors. The first test was performed by students and non-managing employees of Capgemini. This test mainly focused on spelling and grammar, clearness of the questions and questionnaire logic.

After the feedback of the first test was processed, the questionnaire was pretested with two engagement managers. The participants filled in the questionnaire and provided feedback on all questions and on the questionnaire in general. The goal of this pretest was to catch and solve unforeseen problems with the questionnaire, such as phrasing, and question sequence, understanding and correct usage of concepts and questionnaire length (Kidder, 1981). The feedback of the engagement managers was processed. The complete questionnaire can be found in Appendix I.

3.4.3 IMPLEMENTATION OF THE SURVEY

Since the questionnaire was constructed using an online web-tool, distributing it was as simple as sending an invitation mail with the link to the questionnaire. The questionnaire was intended for level 1 – 3 engagement managers, and because of the relatively small size of the population (approximately 50 engagement managers) no sampling was applied, and the entire population (except for the engagement managers who were invited for an interview) received an invitation for the survey.

The single biggest problem in using surveys, is a low response rate (Moody, 2008). In order to reduce the non-response error as much as possible, several measures as proposed by Cooper & Schindler (2003), were applied. First of all, the users received a (semi-)personalized invitation for the survey. “Semi” is used here, because personalization was achieved by means of a script that took the participants’ names from the participants database and automatically sent an invitation mail. After one week, and again after 2 weeks, a reminder was send to those who had not

completed the survey yet. One reminder was send by a vice-president of Capgemini's public sector, who was a sponsor for this research.

After opening the link, the participants were first shown a welcome screen that clearly explained what they could expect and what was expected of them in terms of answers and time. The participants were promised full anonymity.

After 6 weeks, the survey was taken offline. By then, 25 of the 54 participants completed the survey (46.3%). Another 20 participants started with the survey, but did not finish it.

Because of the survey structure and the method of storing the questionnaires used by Limesurvey, the results were stored in over 430 variables. This dataset was first cleaned using Microsoft Excel, after which it was analyzed using SPSS.

3.5 INTERVIEW DESIGN

The second method that was used to gain insight in the application of user participation in practice, was the interview method. Where the survey provided quantitative information on the user participation modes applied by Capgemini engagement managers, the interviews seek to gather qualitative data. The main advantage of interviews over surveys, is that interviews provide the ability to ask more complex questions at length and in depth (Kidder, 1981), and therefore can be perfectly used as an extension of the survey. In this research, the main goal of the interviews is to get the in-depth information on the application of user participation, the reasons why certain user participation modes are applied (or why not), and additionally, find out what roles the participating users had in the project organization. Because of the length of the survey, this final question was not included and was therefore only included in the interviews.

3.5.1 DESIGN

The interviews held, were partly structured interviews. The questionnaire designed in the previous paragraph was used as a guideline throughout the interview, but many open ended, in-depth questions were added. These questions allowed for reflection on previous answers and provided the ability to find out why things happen (Yin, 2003).

The interviewees were asked to think of two projects they had managed in the past; the most successful project and the least successful project in terms of planning, budget and delivered functionality. The interview questions were grouped in three main groups: general questions concerning the interviewee, questions concerning the successful project and questions concerning the unsuccessful project. For both projects, questions were formulated on the applied user participation mode per risk factor. The interview protocol can be found in Appendix III.

3.5.2 PROCESSING

In total, six engagement managers throughout the organization attended in face-to-face interviews. Audio recordings were made of all interview sessions. This minimizes the distraction

during the interviews for both the interviewer and the interviewee. After the interview sessions, word-for-word transcriptions were written of each recording. These transcriptions were entered in QSR NVivo 7.

All transcriptions combined added up to a large amount of data. Finding information in such a large amount of data is not an easy job. Because some structure was used during the interviews, this could be used to compare some of the answers, but distilling information from the open-ended questions required an extra activity; coding.

With coding, labels (codes) are attached to answers, statements or other fragments of the transcriptions. These codes should be selected in such a way that they add meaning to the fragments (Miles & Huberman, 1994). By using a structured set of codes, queries can be constructed which can be used to find and compare information from the different interviews.

Interview coding was done using QSR Nvivo 7. Because all survey questions were also used in the interviews, these questions were used as coded for all the direct answers to these questions. For all other fragments, new codes were added. The coding scheme can be found in Appendix IV.

Chapter 4

4 RESULTS & DISCUSSION

In the previous chapter, the research design is explained. This chapter presents the results of the research, starting with the results of the literature review in paragraph 4.1, followed by the survey and interview results in paragraph 4.2. These results are discussed in paragraph 4.3, and finally, in paragraph 4.4, the limitations of this research are discussed.

4.1 LITERATURE REVIEW

In paragraph 3.3, the methodology used for the literature review is explained. As stated in that paragraph, the literature review seeks to answer three questions:

- *What are the possible user participation modes?*
- *What are the possible risk factors in ISS-projects?*
- *What is the relationship between user participation modes and project risk factors?*

These questions are answered in this paragraph. The base collection of articles is reviewed in order to find a suitable construct for the user participation modes, and to find the most prominent risk factors in ISD projects. Based on the construct and risk factors, a conceptual model is constructed in section 4.1.3. This conceptual model is used to identify the user participation modes that are expected to mitigate each of the risks found in 4.1.2.

4.1.1 USER PARTICIPATION MODES

The first question that is answered by the literature review is: *What are the possible user participation modes?* This section is not seeking to identify all possible user participation modes individually, but rather seeks to identify the different factors of user participation modes. A rough distinction between two sets of factors was already made in the sub-research questions in chapter 2, in which is stated that user participation modes should define *who* is participating, *where in the process* users participate, and what the *role* of the participation users should be. In order to identify all factors of user participation modes and to operationalize the user participation part of the conceptual model, the base collection of articles was reviewed. Table 4.1 provides an overview of the aspects of user participation modes touched upon by the different articles. A summary of the aspects mentioned per article is shown in Table 4.2.

Author	U.P. Mode
[1] (Choe, 1998)	Involve users in requirement phase and design & implementation phase
[2] (Hsu, et al., 2008)	Involve end users Involve in review of IS
[3] (Lin & Shao, 2000)	Involve in planning, analysis, design, testing, and implementation. Type of involvement: consultation, representation, consensus Extend: consultative -> consensus
[4] (Lynch & Gregor, 2004)	Degree of user participation = type & depth Type: consultative (of some users) representative (reference group/testing group, selected users) consensus (working group with many users) Depth: stages of the process frequency voice considered
[5] (Rondeau, Ragu-Nathan, & Vonderembse, 2006)	Use cross-functional teams
[6] (Wagner & Piccoli, 2007)	Only involve users in topics that are important to them at that time. Elaboration likelihood: users must both be motivated and able to process information
[7] (Yetton, et al., 2000)	Involve in project definition and design

Table 4.1: User participation modes in literature

Aspects covered	1	2	3	4	5	6	7
Who			X	X		X	
Where	X	X		X	X	X	X
What role			X	X			

Table 4.2: Covered aspects per author

There are only a few authors that provide concrete information on how user participation should be applied or what the factors of user participation are. Most authors do provide a suggestion in which project phases user participation could be applied, but omit to tell who should participate in these phases, and what it is they should do when participating.

The only exception is found in the article of Lynch & Gregor (2004) who are the only authors to propose a comprehensive framework that also discusses the selection of users for user participation and their role in the ISD project. In the framework for user influence on system features, which is shown in Figure 4.1, Lynch & Gregor split user participation modes into *type of user participation* and *depth of user participation*. Together, these two factors determine the *degree of influence* the users have on the ISD project.

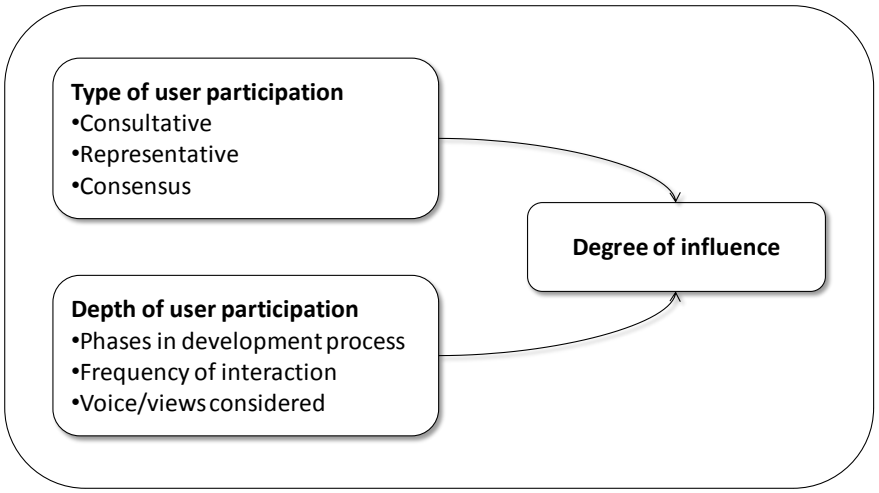

Figure 4.1: User influence on ISD project (Lynch & Gregor, 2004)

Type of user participation

The types of user participation refer to the proportion of users that participate in the ISD projects. Based on Mumford's (1979) classification, Lynch & Gregor indentify 3 types of user participation, which are also used in the work of Lin& Shao (2000). From least to most direct, these types are:

1. *Consultative*; The ISD team consults some users. These users are selected because of their particular knowledge, position in the organization, because they volunteered to help or simply at random from the group of users. The participating users are not necessarily a representative group.
2. *Representative*; Users who are representatives for the user group are selected to participate in reference groups. This means that the group of participating user is a good representation of the entire user group.
3. *Consensus*; This type of participation aims to reach consensus amongst all users or at least a very large number of users. Users participate in working groups through which they can influence the ISD-project.

These user participation types provide a solution to the 'who' aspect described in the beginning of this paragraph, and will be used as such throughout the research.

Depth of user participation

The second aspect determined by Lynch & Gregor, is the depth of user participation. A category value is assigned for this aspect, based on the level of 3 factors:

1. *Stage in development process;* refers to the phase(s) of the ISD process the users are participating in.
2. *Frequency of interaction;* refers to the frequency of interaction between the development team and the users. Rating from one-off to on-going.
3. *Voice/views considered;* refers to the impact of the users' view in the ISD process, whether their voice was considered by the ISD project team.

The factors proposed by Lynch & Gregor provide an answer to the questions '*where in the process should users participate?*' and '*what should be the role of the participating users?*' These factors provide no answer to the third question: *'who should participate?'* In order to answer all three questions, the two factors from the Lynch & Gregor framework, together with the factor '*involved users*' are combined into the user participation mode construct of the conceptual, which is shown in Figure 4.2.

For the factor 'involved users', six groups are identified. These groups were identified partly from the users defined in the RUP literature (Kruchten, 2004) and partly from conversations with engagement managers at Capgemini. These identified groups are:

- Senior management;
- Middle management;
- IT management;
- End users;
- IT maintenance;
- Domain experts.

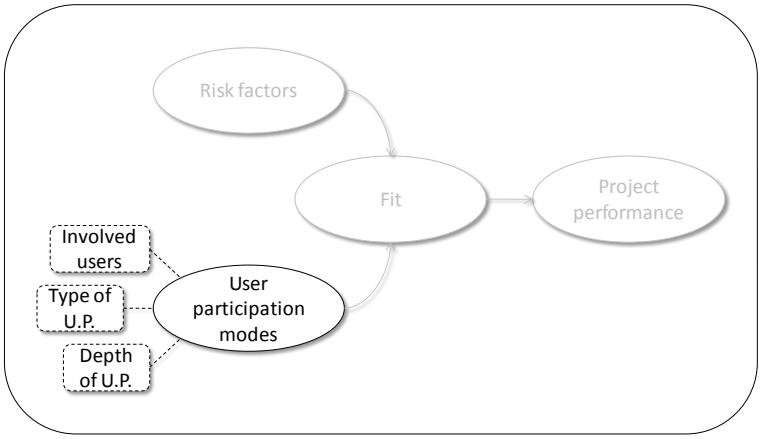

Figure 4.2: Model for user participation modes

4.1.2 RISK FACTORS

The second question that is answered by the literature review is: *What are the possible risk factors in ISD-projects?* In order to identify these risk factors, the base collection of articles is reviewed again. Table 4.3 provides an overview of the risk factors found in the articles.

As shown in the table, Barki et al. (2001) make no distinction between different risk factors; they only use the accumulated risk exposure caused by all risk factors. The other authors do make a distinction. Although it seems that many different risk factors are mentioned in the articles, most factors can be categorized into 5 groups (see Table 4.4): technical complexity, organizational complexity, project size, overambitious demands and requirement incompleteness/unclearness. These are the five main risk factors that will be used for this research. The risk factors are explained below.

Author	Risk Factor	Comment
[1] (H. Barki, et al., 2001)	Risk Exposure (probability of occurrence multiplied by the costs of occurrence)	User participation is part of the management mode that can be chosen to combat risk exposure.
[2] (Blili, Raymond, & Rivard, 1998)	Task uncertainty, competence	
[3] (Choe, 1998)	Organization type	Organic (high)/ mechanic(low)
[4] (Hardgrave, Wilson, & Eastman, 1999)	Innovativeness of the IS; impart of IS on organization, number of users, developer experience with project.	
[5] (He & King, 2008)	Organizational context and ISD context	
[6] (Hsu, et al., 2008)	Changing business environment & evolving processes resulting in uncertainty	
[7] (Lin & Shao, 2000)	System impact, system complexity, development methodology	System impact reduces user attitude, outsourcing reduces user involvement
[8] (Lynch & Gregor, 2004)	Voluntary use of IS by users & Availability of knowledge with developers	If users are free to choose whether to use the system, involvement is beneficial. Also, when information for the system is only present with users, involvement is necessary.
[9] (Rondeau, et al., 2006)	IS complexity	
[10] (Wagner & Piccoli, 2007)	Project size, impact on users	Users are more committed to participating in the project once it starts affecting their work. Before and after that, they don't pay much attention.

Table 4.3: Claims on risk factors in literature

TECHNICAL COMPLEXITY (TC)

Technical complexity refers to the ambiguity and uncertainty in the development of the IS. An IS is complex if new (unknown) technologies are used in it, if it has many links with other systems and lacks a model structure (Lin & Shao, 2000; Rondeau, et al., 2006). Of course, the risk presented to the project by technical complexity depends on the level of experience of the project team members (Blili, et al., 1998; Hardgrave, et al., 1999; Lynch & Gregor, 2004). Technical complexity can refer to fundamental architectural issues, or to the more detailed application issues.

ORGANIZATIONAL COMPLEXITY (OC)

The second risk factor is organizational complexity, which can originate from two aspects; the organization itself and the impact of the IS on the organization. the first aspect is mentioned by He & King (2008) and Choe (1998). They refer to the structure of the company (organic vs. mechanic) and the power structure in an organization regarding to the IS. In other words: is the use of the IS by the employees mandatory or voluntary.

The second aspect refers to the potential changes in the organization and the users' working life, brought about by the implemented IS (Lin & Shao, 2000; Wagner & Piccoli, 2007).

PROJECT SIZE (PS)

This risk factor is mentioned by Hardgrave et al. (1999) and Wagner & Piccoli (2007), and refers to the size of the project, measured in man-hours. Larger projects can be more difficult to manage; there are more people involved, more tasks to be performed and more things to go wrong. Adding an extra management layer to the project organization might prevent this, but might also make the project organization bureaucratic and slow to react.

OVERAMBITIOUS DEMANDS (OV)

This risk factor refers to the high-level demands of the customer. A customer can simply expect too much of an ISD project, which presents a risk to the project; the risk of not meeting the customers' demands. Overambitious demands is also mentioned in the report of the Netherlands Court of Audit (2007) as one of the top three causes of project failure. This risk factor does not refer to detailed requirements, but to the high-level, fundamental requirements of a project. Examples of overambitious demands are customers asking stability in highly instable environments, demanding too much work done in too little time, demanding too much functionality or demanding the project to be completed for too small a budget. (Blili, et al., 1998; Hardgrave, et al., 1999; Hsu, et al., 2008).

REQUIREMENT INCOMPLETENESS/UNCLEARNESS (RQ)

In an ideal project, all requirements are known and clear in the early stages of the projects, and do not change once they are set. In reality, however, this is hardly the case. Unstable (business) requirements, uncertainty and sometimes, customers not knowing exactly what they want, are examples of factors that make requirements volatile and present additional risk to the project (Blili, et al., 1998; Hardgrave, et al., 1999; Hsu, et al., 2008)

Risk factors	1	2	3	4	5	6	7	8	9	10
Technical complexity		X		X			X	X	X	
Organizational complexity			X		X		X	X		X
Project size				X						X
Overambitious demands		X		X		X		X		
Incomplete/unstable requirements		X		X		X				

Table 4.4: Risk factors categorized

Table 4.4 shows an overview of the risk factors and articles in which they are mentioned. Of course, one can think of other risk factor besides the ones shown, but the literature reviews shows that these five risk factors are the most influential risk factor in ISD projects. For the sake of convenience, other less influential risk factors are left out. This means that the risk factor construct of the central research model can be operationalized as shown in Figure 4.3.

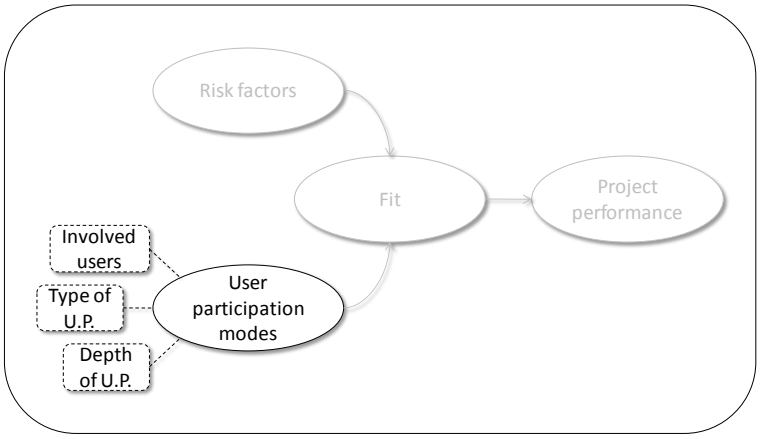

Figure 4.3: Risk factors

4.1.3 CONCEPTUAL MODEL

The literature review conducted in the previous two paragraphs, both operationalized parts of the research model introduced in paragraph 2.2; the risk factors and the user participation modes. These two constructs are combined into the conceptual model shown in Figure 4.4

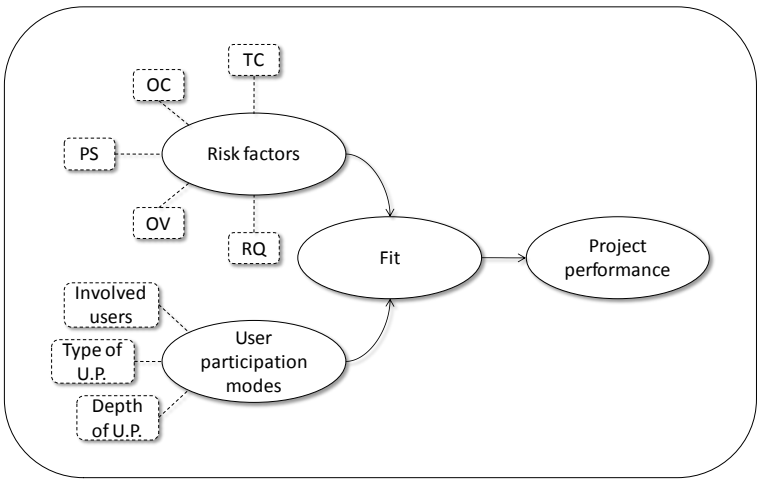

Figure 4.4: Conceptual model for the application of user participation

The third construct in the conceptual model – project performance – is one that receives many attention in IS literature. A famous example is the 'DeLone and McLean Model of Information Systems Success' (DeLone & McLean, 2003). Although it would be very interesting to examine all factors of project performance and their relationship with the application of user participation, this would also complicate the model by adding extra variables and dependencies. Due to the time limitations for this research, the scope has been narrowed down to a more manageable

size by considering only ‘perceived success’ instead of ‘IS success’ for the construct of project performance, and by giving only two options for this variable: ‘successful’ and ‘unsuccessful’.

4.1.4 EXPECTED RESULTS

In the previous section, the conceptual model for the application of user participation is introduced. The literature review provided the risk factors which can threaten an ISD-project, and the variables of user participation modes which can be applied to mitigate the risk. In the conceptual model, the assumption is made that if the right user participation mode is chosen for a certain risk, this would have a positive effect on project performance (measured in perceived success).

This section will discuss the final construct in the conceptual model, which is the fit between the risk factors and user participation modes. Based on literature, a user participation mode will be identified for each risk factor that is expected to mitigate the risk

TECHNICAL COMPLEXITY

Technical complexity can exist in fundamental issues, like the architecture of the IS, and in more detailed issues, like applications and connectors - in other words; the realization of the IS. RUP literature states that in the inception phase of an ISD project, the project scope and feasibility are determined, while the architecture and development strategies should be defined in the elaboration phase (Kruchten, 2004). This means that when people from the client organization participate in fundamental architectural issues, this will most probably occur in the inception and elaboration phase of the project. Because such issues tend to have a high-level, organization wide scope, it is expected that IT management and domain experts are involved in these phases. Domain experts are involved for their knowledge (consultative), while IT management is also involved in decision making (Consensus).

Detail issues on application level are, according to the RUP phases, dealt with in the construction phase, while infrastructure issues can occur as late as in the transition phase, as support for the implemented IS. For these issues, detailed knowledge is required, and IT maintenance and domain experts are expected to participate on a consultative basis. The participation can be intense (they can be part of the project team for example), but they are expected not to participate in decision making.

ORGANIZATIONAL COMPLEXITY

Organizational complexity depends on the organizational aspects and on the impact of the IS on the organization. Two issues are important in this context; building an IS that fits the organization and adapting the organization so that it fits the IS. The first is a design issue that takes place in the inception and elaboration phases of a projects, the latter is a change management issue that will probably arise in the transition phase.

For both issues, the senior management and middle management are expected to participate, both on a consultation (provide information about the organization) and consensus basis (participate in decision making).

Management is not the only group involved; the implementation of an IS has a large chance to fail when user acceptance is lacking, especially when the impact of the IS on the organization is high. Lin & Shao (2000) propose the application of end user participation in order to increase user acceptance and thereby increase the probability of success.

Choe (1998) adds an important side mark to this theory: he states that the necessity of end user participation depends on the organization type. End user participation should be applied in case of an organic organization (low level of hierarchy), but not in case of a mechanic organization (high level of hierarchy). In mechanic organizations, management has much more power and can enforce the usage of an IS.

In an organic organization, a higher level of end user participation is expected in both the elaboration and transition phase. This can either be a representation of end users or all end users. A consultative participation is expected.

PROJECT SIZE

As was described in section 4.1.2, this risk factor refers to the arrangement of the project, which can be threatened by the size of the project. Because of this threat, it might seem strange to involve people in order to mitigate the risk; after all, this will increase the project size even more. However, if people are involved in such a way that the project arrangement improves, the threat posed by the project size will decrease.

In case of large projects, a high level of middle management and IT management involvement is expected. Part of project management can be delegated to these managers, which will reduce the amount of work for the project team. This participation is expected to take place in the construction and transition phases of a project.

OVERAMBITIOUS DEMANDS

The risk ‘overambitious demands’ refers to high level, fundamental demands set by the customer, which, in most cases, is a senior manager or middle managers. Involving senior management and middle management, i.e. notifying them that their demands are overambitious and together search for realistic alternatives, is therefore very important. When failing to do so, the project is bound to not fulfill the expectations of the customer.

The senior management and middle management are expected to be involved in the early stages of the project, where changing these high-level demands will not have a large impact on the project. The later in the project this happens, the larger the impact of the changes (Avison & Fitzgerald, 2006). So the participation is expected to take place in either the inception phase or the elaboration phase of the project. The participation is expected to be on a consensus basis.

INCOMPLETE/UNSTABLE REQUIREMENTS

IS requirements can be divided into 2 basic levels (Davis, 1982; Kirsch & Haney, 2006). The first level contains the organizational or global requirements. These requirements define the overall structure and usage of the IS and can be considered as the strategic requirements of the IS, because they define the management motivation for the implementation of the IS (Davidson, 2002).

The second level contains the detailed requirements, defined on the application level (Kirsch & Haney, 2006). These requirements provide a detailed description of how the IS should work (Davidson, 2002).

When determining the organizational requirements, high level knowledge on the organization-wide information needs and business activities is needed, while for the detailed requirements, domain specific knowledge and detailed knowledge on specific processes is required (Kirsch & Haney, 2006).

When dealing with the risk posed by incomplete or unstable requirements, it is therefore important to realize on what level these requirements are, in order to determine who should be involved in mitigating the risk. Considering the roles defined in section 4.1.1, it can be expected that senior management, middle management and it management is to be involved in case of global requirements for their high level knowledge on the organization wide information needs and business activities, while in case of detailed requirements, the focus will be on end users and domain experts. The first group is expected to be involved in the early phases of the project. Their participation concerns the requirements for the overall structure; they need to be known and stable as early as possible. For this group, participation on consensus base is expected; they all have a large influence on decision making.

The second group is expected to be involved a bit later in the project. The base of the IS can be build without having all the detailed requirements. These can also be gathered during the construction of the IS. End users and domain experts are expected to be involved for their knowledge, but are not expected to have a high influence on decision making. Their participation is expected to be on a consultative basis.

In the previous sections, an expected user participation mode was constructed for every risk factor. Table 4.5 shows an overview of these user participation modes.

Technical complexity		
User	Project phase	Type of participation
IT management	Inception & elaboration	Consensus
IT maintenance	Construction & transition	Consultative
Domain experts	All phases	Consultative

Organizational complexity		
User	Project phase	Type of participation
Senior management	Inception, elaboration & transition	Consensus
Middle management	Inception, elaboration & transition	Consensus
End users	Elaboration & transition	Consultative

Project size		
User	Project phase	Type of participation
Middle management	Construction & transition	Consultative
IT management	Construction & transition	Consultative

Overambitious demands		
User	Project phase	Type of participation
Senior management	Inception & elaboration	Consensus
Middle management	Inception & elaboration	consensus

Unstable/incomplete requirements		
User	Project phase	Type of participation
Senior management	Inception & elaboration	Consensus
Middle management	Inception & elaboration	Consensus
IT management	Inception & elaboration	Consensus
End Users	Elaboration & construction	Consultative
Domain experts	Elaboration & construction	Consultative

Table 4.5: Expected user participation modes

4.2 SURVEY AND INTERVIEW RESULTS

In the previous paragraphs, a detailed model for user participation is developed. The factors that make up project risk and user participation models are determined and the presumed relations between the different factors are identified. In this paragraph, the results of the survey and interviews are presented. In order to validate the user participation modes proposed in section 4.1.4, the survey and interview results are reviewed to identify whether these proposed user participation modes are applied in practice, and the reasons why certain user participation modes are applied (or why not) are discussed. In the final paragraphs, the research itself, and its limitations are discussed.

4.2.1 GENERAL OUTCOMES OF THE SURVEY AND INTERVIEWS

For this research, a survey was sent to 50 engagement managers at Capgemini, 6 of whom were also interviewed. In total, 28 engagement managers returned a completed survey. This means that the response rate was 56%. All participants of the survey were asked about two projects; their most successful and their least successful projects. This means that the survey results hold information about 28 successful and 28 unsuccessful projects. Table 4.6 shows the engagement management level of the engagement managers that were invited for the survey and that of those who returned the survey. Table 4.7 shows the engagement management levels of the interviewees. Because anonymity was promised in the interviews, fictitious names are used in the result section.

Engagement mgt. level	invited	Respondents
level 1	68%	75%
level 2	20%	11%
level 3	12%	14%

Table 4.6: Engagement mgt levels survey

Interviewee	Engagement mgt. Level
Albert	1
Ben	3
Chris	3
Dick	3
Erik	1
Floor	2

Table 4.7: Interviewees

In the literature review, the decision was made to focus on the five largest risks in ISD-projects, according to IS-literature. The first test that was performed, was on the presence of these risk factors in the projects inspected for this research. Table 4.8 shows for each risk factor the percentage of projects for which the engagement managers reported the risk to be present.

Risk presence in projects	
Technical complexity	64%
Organizational complexity	70%
Project size	21%
Overambitious demands	52%
Unstable/incomplete requirement	68%

Table 4.8: Risk presence

When looking at a conceptual model in which risk is one of the independent variables and project success is the dependent variable (as is the case in the model used for this research), the first relationship between these two variables that intuitively comes in to mind is the negative relationship between the presence of risk and project success, i.e. the more riskier the project, the smaller the probability of project success. This research however, focuses on risk mitigation, i.e. reducing the effect of risk on project success. If the results of the survey show a strong, significant and negative relationship between the presence of risk and project success, not taking in account whether the risk was mitigated or not, further examination of the effectiveness of risk mitigation will be difficult.

The relationship between risk presence and project success was examined using SPSS. Since all examined values were nominal values (either '0' of '1' for both risk presence and success), a Pearson Chi-Square test was used to examine the relations (Cooper & Schindler, 2003). The data resulting from the survey shows that at least one of the risk factors was present in nearly all projects. The statistical test obviously shows no significance for the relationship between the presence of at least one of the risk factors in a project and project success (see Appendix II).

The next question that comes in mind, is whether user participation was applied to mitigate the risks present in the projects, and, more important, whether this had any effect on the performance of the project. The results show that many engagement managers reported to have applied user participation to mitigate the risks present in their projects. Table 4.9 shows the percentages of projects where user participation was applied in case a risk was present. Although there is a slight difference in the application of user participation between successful and unsuccessful projects, no significant differences can be found.

Mitigated risks with user participation		
Risk	Successful	Unsuccessful
Technical complexity	94%	53%
Organizational complexity	90%	84%
Project size	86%	40%
Overambitious demands	82%	50%
Unstable/incomplete requirements	95%	84%

Table 4.9: User participation applied when risk present

In the following sections, the user participation modes that were applied for each risk factor are presented.

4.2.2 TECHNICAL COMPLEXITY

RESULTS

The survey results show that in over 60% of the projects reported by the engagement managers, technical complexity was considered to be a risk for the project. Technical complexity is defined in section 4.1.2 as the risk that occurs in case of a large number of dependencies and connections with other systems, or when working with new technology. The interview results show that in many cases, these were in fact the sources for technical complexity.

When Chris was asked about technical complexity in his most successful projects, he stated that:

"The problem was not so much the unfamiliarity with the technology we used; this was no rocket science. The thing was: we had to combine 16 existing systems into the new IS. The difficulty was in the amount of systems we had to combine."

When Erik was managing the development of an inter-ministerial IS, the complexity arose from the usage of new technology.

"We were the first to use a new inter-ministerial fiber-optics network that wasn't fully operational and connected to the intranets of the ministries."

Complexity can also arise from lacking of model structure or from complex model structure. When Floor was managing the development of a new IS for a large bank, she said:

"In order to connect with all the existing systems, we designed a central service bus, which was new to the organization. The architecture had to be designed in a generic way, so that future extensions of the system could easily be implemented."

As stated in section 4.1.2, the technical complexity heavily depends on the knowledge available in the project team. Dick was managing the modification of an IS in a large bank. He said about the technical complexity in the project:

"The IS itself was not complex; we knew the system and did not use new technology, we used pretty old technology: COBOL. In fact, that was the problem. COBOL is a well known programming language, but since it is outdated, finding a programmer for it is a difficult job. This is the problem with legacy: the knowledge is gone."

These results indicate that technical complexity is a risk that is present in a large number of the investigated projects, and that this risk is often caused by the factors described in section 4.1.2.

The survey shows that the engagement managers questioned for this research applied user participation in 72% of the projects in which technical complexity was present. For successful projects, this percentage was 94%, and for unsuccessful projects, this was 53%. Figure 4.5 shows what people from the client organization were involved when user participation was applied. For example: in the successful projects in which technical complexity was present and user participation was applied, approximately 70% of the engagement managers involved IT management to mitigate the risk.

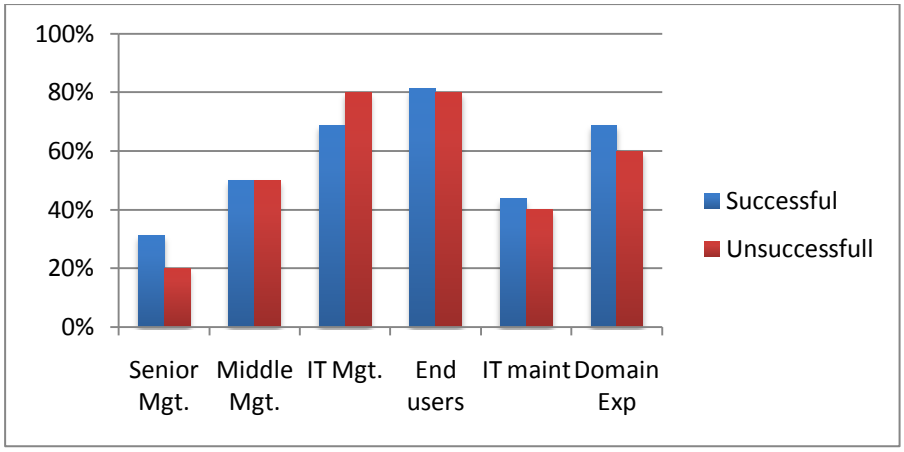

Figure 4.5: Survey results for technical complexity

The survey results show high participation levels for IT management, key users and Domain experts, and moderate participation levels for middle management and IT maintenance. The results show almost identical behavior in successful and unsuccessful projects. The interview results provide more information on how user participation was applied in order to mitigate risk.

IT management is often involved in projects that take place in large organizations with many departments. The IT managers are then involved for coordination aspects, and mostly during the design and transition phase of the project. Erik managed a large project at the defense department. On the participation of IT management, he says:

"IT managers from every department were involved in order to make the rollout work. They had little to no influence on the design of the system; this was determined at a higher level."

IT maintenance is often responsible for the preparations which are required for the implementation of the IS. Their task is to facilitate. This means, they're involved throughout the process, but particularly in the transition phase. In the inter-ministerial project managed by Eric, IT maintenance had an important role:

"IT maintenance personnel of all ministries involved participated in the project. Their task was to get the inter-ministerial fiber optics network up and running. They had the freedom to write their own plan of approach and to form their own team. As long as it fitted within the boundaries of the entire program."

Domain experts are often involved in the early phases of the project, in which the IS is designed. They are involved for their knowledge on particular subjects. Which is required at that phase. The frequency of participation is low, and in the construction phase and transition phase, their knowledge is usually no longer required, as it is already used in the ISs' design. On the involvement of domain experts in the development of a new IS for a large bank, Floor states:

"The new IS had to connect with a lot of existing systems, of which we had little knowledge. We involved domain experts from the client's organization for their knowledge on these systems. They participated in the design phase of the project."

When Ben was managing the development of an IS for a large logistical firm, domain experts were also involved in later stages of the project.

"We were unfamiliar with the financial systems and calculations used by the client. For this knowledge, experts from the client organization participated. Initially, only in the early stages of the projects, but because we encountered a lot of problems when we reached completion of the projects, they were involved again later on."

Technical complexity is shown to be a risk that is present in many ISD projects, and user participation is often applied in order to mitigate the risk. IT management, end users and domain experts are involved by most engagement managers, followed by middle management and IT management. There seems to be little difference in applied user participation modes between successful and unsuccessful projects

MEASURED VERSUS EXPECTED USER PARTICIPATION MODES

The survey and interview results show a high level of participation for IT management, IT maintenance and Domain experts as was expected. The phases in which they are involved and the roles they had in the project organization generally match with the expectations, with one clear difference; IT management was expected to participate in the early phases of a project, while the interview results show that they are also involved in the transition phase. This can be explained by the fact that IT management is not only involved for their high-level knowledge on IT processes, but also participate in coordination of the process. The interviews show that this occurs especially in the transition phase of the project.

Although a reason for involving end users in case of technical complexity was not found in literature, the survey results do show a high level of end user participation. This was unexpected. The interviews show that end users are not involved in finding and implementing solutions for these technical problems, but participate in testing and reviewing the solutions. Dick had difficulties in one of his projects with a highly complex security system for a web application. End users were involved, but not to help with the development of this solution, but to test the solution.

"We would invite a number of end users and let them work with the application. During this, they were observed and interviewed. You want them to have as little trouble as possible; otherwise, you will need large helpdesk capacity."

In the definition of technical complexity provided in section 4.1.2, two sources of technical complexity are mentioned: new technology and a high number of connections and dependencies. The interviews reveal a third source: legacy systems. This is in fact the opposite of new technology, and its application can be quite simple, but the problem that often occurs with legacy, is that the knowledge of these technologies is often unavailable in a project team. This means that in case of technological complexity caused by legacy systems, domain experts from the client organization are involved. That is, if they are available.

CONCLUSIONS

Based on the findings that are discussed above, the following conclusions can be drawn:

- The user participation modes that were expected to be found based on the literature, were found in the projects surveyed for this research;
- End user involvement was much higher than expected;
- There is an additional source of technical complexity, which is the usage of legacy systems;
- The results show little differences in user participation modes between successful and unsuccessful projects.

4.2.3 ORGANIZATIONAL COMPLEXITY

RESULTS

The survey results show that in almost three quarters of all projects reported by the engagement managers, organizational complexity was considered to be a risk for the project. Organizational complexity is the risk that is caused by the type of organization the IS is implemented in, and the impact of the IS on the organization. It is closely related to change management and technology acceptance. The interview results provide some examples of how organizational complexity affects a project.

Chris managed the development of a new IS for an R&D department.

"This system affected everything in the R&D departments worldwide. They had been working with numerous separate systems and were now moving to one central and global R&D system. This had a great impact on the way R&D was organized worldwide."

Floor joint a large project that was developing an IS for the courts of justice. When asked how organizational complexity influenced her project, she answered:

"The entire organization was divided in departments that were highly autonomous. Most of these departments saw the need to change, but they all had their own ideas about how the new IS should work. Developing one central IS for the entire organization was therefore very difficult."

When Ben was working on an IS for a logistical firm, the organization complexity arose from the impact the system would have on the organization.

"First of all, the system would replace 300 people in the company. It would also change the organization from a decentralized one with a large number of autonomous offices, into a flat and centralized organization."

The survey shows that the engagement managers questioned for this research applied user participation in 87% of the projects in which organizational complexity was present. For successful projects, this percentage was 90%, and for unsuccessful projects, this was 84%. Figure

4.6 shows what people from the client organization were involved when user participation was applied.

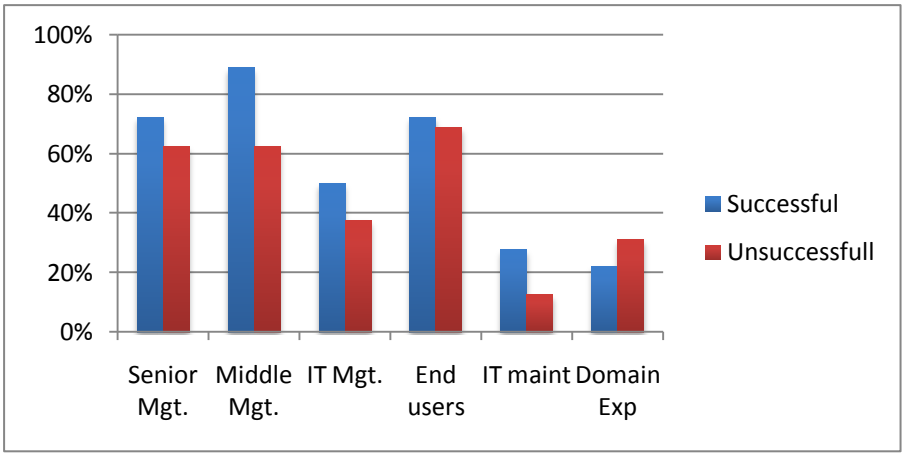

Figure 4.6: Survey results for organizational complexity

The survey results show a high level of participation for management (senior management, middle management as well as IT management) and end users. The interviews reveal that management is involved in nearly all projects in which organizational complexity is considered to be a risk. The degree of participation and the reason they participate differ for the different management levels.

In most projects, a high degree of middle management and IT management involvement is measured. There is in fact little difference between middle management and IT management involvement. This mainly depends on who initiated the projects. Albert for example, managed a project which was initiated by an IT manager high in the organization.

"In case of organizational problems, I was dealing directly with the customer. This was a high level manager in the IT department of the organization."

IT and middle management often participate on a regular basis. They are part of the project team or even in the steering committee. They have a great influence on the project when it comes to organizational issues. Their role is considered to be leading for the projects. Erik mentioned:

"We had managers from every department taking place in our project team."

Chris, who was program manager, had little contact with IT and middle managers, but they were involved in the projects:

"My project managers were responsible for the contact with IT and middle management. There was one project manager who was responsible for IT. He involved IT managers. The other project manager was responsible for business. All department managers of the departments involved in the project were in his project team."

While building a single generic system that was to be used by many different departments, Floor faced the problem that it was virtually impossible to build one system that would fit all departments without having the departments changing their ways of working.

"We involved all department managers in order to set the guidelines for the project which would work best for all departments. It is impossible for one person to make such decisions. It is also very difficult to make them with all managers together, since they hardly ever agree, but in the end, we managed."

IT management and middle management are mostly involved in the inception and elaboration phase - where the IS takes shape – and in the transition phase.

Senior management is mostly involved in case of organizational conflicts and problems that cannot be solved with the help of middle management. This happens incidentally and in all project phases.

Chris says about senior management participation:

"I had a good relation with the senior managers. In case of organization problems, there was a quick escalation path which worked very well."

Erik had similar experiences in his inter-ministerial project:

"There were little organizational problems. Once you have the secretary of the highest governing body on your side, these problems tend to disappear."

Whether end users are actively involved in the projects, very much depends on the type of organization. When the organization is strictly hierarchical, organizational issues are mostly solved through management. In the less hierarchical organizations, user acceptance plays a more significant role, and end users are involved in the projects. The interview results show that such end user involvement is often done in the form of a workshop. Floor arranged such workshops in the early phases of the project she managed at a large bank.

"We called the end users together in workshops and asked them if they had suggestions to overcome several organizational problems. We used this output. Of course, we also had our own planning and project boundaries to consider."

End users are not always involved to find answers to questions, but also to achieve user acceptance. Chris involved end users for this very reason.

"We involved the end users to generate goodwill. This prevents organizational issues from occurring during the implementation of the IS."

End users are thus generally involved in a consultative way. Their voices are considered but not always regarded as leading for the projects. End user participation often takes place in the elaboration and transition phase.

MEASURED VERSUS EXPECTED USER PARTICIPATION MODES

The survey and interview results for organizational complexity correspond with the expected patterns. There is a high level of involvement for senior management and middle management in the inception, elaboration and transition phase, and a high level of end user participation (depending on the level of hierarchy in the organization) in the elaboration and transition phase. The depth of participation for the senior management was lower than expected; instead of pro-active participation, senior managers tend to be involved only when there is a conflict with middle management. In this case, the problem is escalated to the senior management.

The level of end user participation depends on the level of hierarchy in an organization, as was expected. In case of a strict hierarchy, the level of end user participation is low. The interview results show that hierarchy heavily depends on culture; companies in the UK and Germany for example, tend to have a higher level of hierarchy than Dutch companies, as was mentioned by Chris:

"The German culture works with hierarchy. If the manager makes a decision, there will be no discussion, it is simply followed. This does not happen in the Netherlands; everybody wants to be involved."

Organizational complexity is a difficult risk to mitigate when the senior management is indecisive or lacks the will to change. This often happens in governmental organizations, where the need for a new IS often springs from legislation. Erik mentions this for a project he managed for the department of defense:

"The generals were often reluctant to make decisions; they would rather not get their hands dirty, even though they had the final responsibility."

CONCLUSIONS

Based on the findings that are discussed above, the following conclusions can be drawn:

- The expected user participation modes globally correspond with the user participation modes found in the surveyed projects;
- In successful projects, a slightly higher level of user participation was measured that in unsuccessful projects;
- The depth of senior management involvement was lower than expected. Engagement managers tend to focus on the lower management levels;
- The level of end user participation depends heavily on the culture in the client organization.

4.2.4 PROJECT SIZE

RESULTS

Although project size is considered as a great risk to ISD projects, it was only present in 20% of the projects reported by the engagement managers. The number of engagement managers that actually applied user participation in order to mitigate the risk posed by project size, is even lower than that. It is not possible to do a quantitative analysis with, and to draw any conclusions from this small amount of data.

From the interview results, it becomes clear that project risk is in some cases considered as a risk factor in projects, but not one that can be mitigated by applying user participation.

MEASURED VERSUS EXPECTED USER PARTICIPATION MODES

The engagement managers who participated, hardly applied user participation in order to mitigate the risk posed by project size, while a high level of middle management and IT management involvement was expected. The interview results reveal that engagement managers tend to mitigate this risk by applying project management techniques that can be found in the other two dimensions of the contingency model for software project risk management of Barki et al. (see paragraph 2.2); internal integration and formal planning. Chris, for example, mentions the formation of a steering committee:

"In case of large projects, it is important to have the steering committee in place at the very start of the project. This way, you can keep track of everything that happens within the project."

Another technique that is used in case of large projects, is dividing the project into smaller pieces, as Floor did in one of her projects:

"It is like slicing the elephant. The project is too large to oversee it all at once, so you have to cut it into little pieces. This makes it manageable again."

The risk posed by project size is not one engagement managers like to mitigate with user participation. Engagement managers have other solutions for that.

CONCLUSIONS

Based on the findings that are discussed above, the following conclusions can be drawn:

- Project size was mentioned as a risk factor in only a small number of projects;
- User participation was hardly used in the surveyed projects in order to mitigate this risk;
- Engagement managers use other project management techniques to mitigate the risk presented by project size.

4.2.5 OVERAMBITIOUS DEMANDS

RESULTS

The risk factor overambitious demands refers to the risk posed by high level, fundamental demands set by the customer. The survey results show that this is considered to be a risk in 50% of the projects reported by the engagement managers.

The interviews reveal that there are different demands that can be overambitious. First of all, the planning set by the customer can be overambitious. Floor managed a project which was part of a larger program consisting of a large number of projects. On overambitious demands, she said:

"The project I managed was not overambitious itself, but the entire program was. If all the projects were executed one after the other, it would take nearly 12 years to complete them. Therefore, they were executed parallel. The customer demanded that we executed up to 5 projects at the same time. This was overambitious; you will have troubles finding resources."

Dick had to deal with similar overambitious demands in a project he managed for a large bank.

"The project was achievable, but not within the boundaries set by the customer. It was a fixed price/fixed date project. Usually, fixed dates have external reasons; it usually means that they started the project too late."

Another demand that can be overambitious, is the expected functionality of the IS. Albert says about these demands:

"What was overambitious about this project, is that they wanted to use this one IS for so many different sectors of the organization, who recently all had their own systems."

Finally, the reason why a customer wants to have a new IS can be overambitious. Again, Albert had experienced this in another project he managed for a large NGO:

"The customer wanted the system to change the entire organization, transforming it into a modern organization, lowering the bureaucracy. This cannot be done by an IS; it is just a tool. Changing an organization requires so much more than that."

The survey shows that the engagement managers questioned for this research applied user participation in 66% of the projects in which overambitious demands were present. For successful projects, this percentage was 82%, and for unsuccessful projects, this was 56%. Figure 4.7 shows what people from the client organization were involved when user participation was applied.

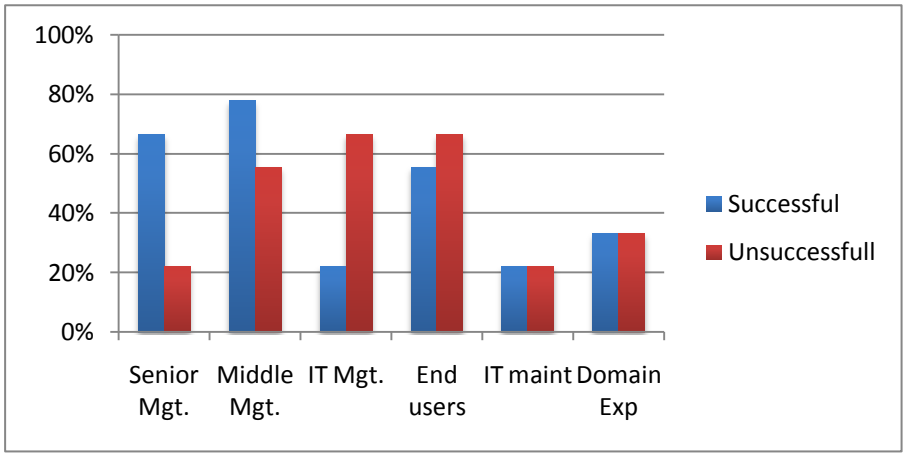

Figure 4.7: Survey results for overambitious demands

The survey results show that engagement managers involved management (senior management, middle management and IT management) and key users to mitigate the risk posed by overambitious demands. There is a great difference between the user participation mode applied in successful projects and unsuccessful projects. In successful projects, the focus heavily lay on the participation of senior and middle management, whereas in unsuccessful projects, IT management and key users were involved in mitigating this risk.

The interviews show similar results. In most successful projects, senior management and middle management was involved. In very few projects, this was done with actual participation of these persons in the project. The project Ben managed for a logistical firm is an example of this:

"The participation of senior management went well. If we found certain demands overambitious, we discussed them with management, and together we would find solutions. This was done until the design was finished."

In many other projects however, there was little discussion on the topic of overambitious demands. Floor for example, said about her project:

"We informed the senior management that their plan would not work and told them what problems they could expect if they would stick to their plan. They stuck to their plan, and the problems we mentioned did appear."

Erik managed a project in which end-users also participated in mitigating risk:

"We promised to deliver things we could not deliver, and we knew it. Certain products required for the IS were not there. Other departments in the client's organization had to deliver them. If we wanted to deliver on time, they had to help us."

If people from the client organization are really involved in preventing overambitious demands from becoming a risk, this is done in the early phases of the project. The interviews reveal that often, the involvement takes place in later stages, but this involvement is often limited to informing the customer that the demands cannot be met. This means that the risk has already occurred.

MEASURED VERSUS EXPECTED USER PARTICIPATION MODES

For overambitious demands, a clear difference is found between successful and unsuccessful projects. In successful projects, a high level of senior management and middle management participation is shown, which corresponds with the expectations. For unsuccessful projects, very little senior management participation is found. Instead, a high level of end user participation is found.

As explained in section 4.1.2, overambitious demands refer to high-level issues, which often concern the top management of an organization. Not involving senior management in mitigating the risk of overambitious demands, in other words, not informing the senior management that their demands are overambitious and not trying to find a solution for this together with the senior management seems illogical. The interviews however reveal, that there are several reasons why senior management is not involved.

IT consulting is a competitive market. Winning a contract on a market which is under pressure, means that prices must be low and/or quality must be high. Sometimes, consulting firms agree with demand of which they are not sure they can fulfill them. Involving the senior management of the client organization in this case probably means losing the contract.

Although the source of overambitious demands is in the very beginning of a project, it is often later in the project discovered that the demands are in fact overambitious. Sometimes, this is discovered as late as in the construction phase. In this case, it is too late to adjust the project plans, and the project is – at least partially – bound to fail. This is what happened in the project Albert managed:

"The project ran for years, but it appeared impossible to develop one single IS for the entire organization. Finally, the customer decided to pull the plug. We had little influence on this decision."

Even if the engagement manager involved senior management, this is no guarantee that the risk can be mitigated. Erik experienced this:

"We informed the senior management, but what you often find is that people are reluctant to play down on their demands and stick to their original plans.

Involving end users and IT management in a project with overambitious demands is often not done in order to solve the problem but rather in order to make the best of it.

CONCLUSIONS

Based on the findings that are discussed above, the following conclusions can be drawn:

- Great differences are found between user participation modes applies in successful and unsuccessful projects when mitigating the risk presented by overambitious demands;
- In successful projects, the focus of user participation is on senior and middle management, as was expected based on the literature;

- In unsuccessful projects, a high level of IT management and end user involvement is measured;
- Overambitious demands are often not identified in the early stages of the project, but later on. This makes the risk harder to mitigate;
- Engagement managers tend to agree on overambitious demands because of the competitiveness of the market.

4.2.6 INCOMPLETE/UNSTABLE REQUIREMENTS

RESULTS

Having unstable or incomplete requirements in the project was seen as a risk in two third of the projects reported in the survey. Whereas the overambitious demands refer to the high level specification of an IS, the requirements refer to the detailed specifications, as is described in section 4.1.2. The interviews show that unstable or incomplete requirements occur in projects in different ways. It can happen that the requirements are simply not provided by the customer. This was the case in the inter-ministerial project managed by Erik:

"The definition of the project was written on two sheets of paper. No requirements were provided. We simply got a carte blanche and had to find the requirements ourselves."

In the project Floor managed, the opposite happened:

"We had to build the system for a large number of departments, and they all had their own requirements, many of which contradicted."

These are examples of projects in which the requirements were not yet provided at the start of the project. It also happens that the requirements were formulated, but changed during the project. Albert said about this:

"We though the requirements were clear, but during the project, they appeared to be ambiguous."

According to the survey results, the engagement managers questioned for this research applied user participation in 89% of the projects in which incomplete/unstable requirements were present. For successful projects, this percentage was 95%, for unsuccessful 84%. Figure 4.8 shows who participated when user participation was applied.

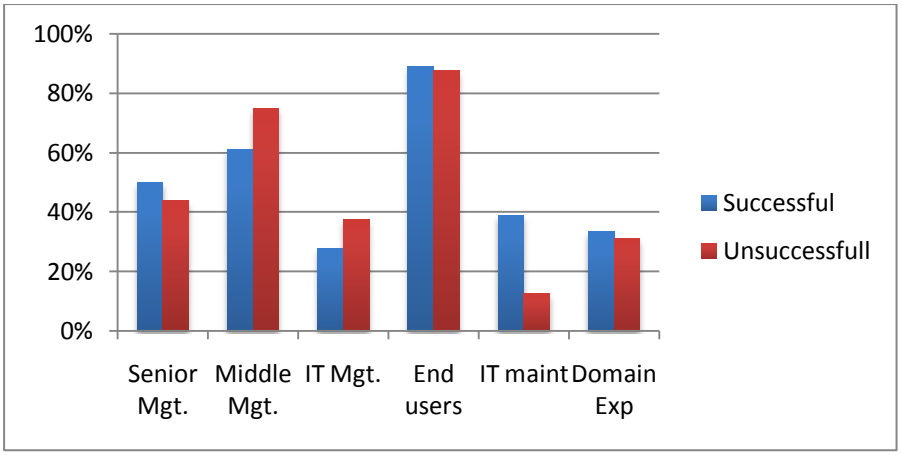

Figure 4.8: Survey results for unstable/incomplete requirements

The survey results show a high level of user participation for end users and middle management, and a moderate participation for senior management. There is little difference in user participation between successful and unsuccessful projects. The interview results show that the focus of user participation for this risk factor lies on the involvement of end users.

In order to clarify the requirements for the R&D IS, Chris applied user participation in the following way:

"It is important to know what the "must haves" and "nice to haves" for the IS are. These were gathered in workshops in which the end users and IT managers were involved. Middle management was only involved in the barest necessities. All these workshops toke place in the analysis phase of the project."

In the project for a large bank managed by Floor, middle management played a more important role in the clarification of requirements:

"The business requirements were drawn up with the product managers in workshops. Their influence on the project was very large. […] Requirements regarding the user interface and more detailed processes were drawn up in workshops together with the end users. This happened in a more consultative way."

In some projects, the number of stakeholders in the client organization is too large to involve them all in the process of requirement gathering. This was the case in the inter-ministerial project Erik managed:

"Every once in a while, we organized conferences in which the project teams and interested managers and end users participated in workshops. From these workshops, the requirements were distilled."

Dick had a different problem in a project he managed for a governmental organization; the IS they developed had to be used by nearly all adults in the Netherlands.

"Since we had millions of end users, it was impossible to involve them all. We used a panel of voluntary civilians, who we used as representatives for the actual end users. They were invited for sessions in which the requirements regarding usability were defined."

User participation in order to mitigate the risk of unstable/incomplete requirements usually takes place in the early phases of the project (inception and elaboration). The focus lies on the end users, which are mostly involved through workshops in a consultative way. Middle management is often involved. Their influence is larger than the influence of the end users.

MEASURED VERSUS EXPECTED USER PARTICIPATION MODES

The pattern found for user participation in case of unstable/incomplete requirements generally corresponds with the expected pattern; there is a high level of participation for senior management, middle management and end users in the early phases of the project. The focus of user participation lies on end user participation. This is no surprise; end users are closest to the customers and processes, so they provide the most information on these topics.

A technique often used in end user participation is a workshop, from which the requirements are distilled. Three important issues which should be taken into account in workshops, are mentioned in the interviews. First of all, the way of thinking of most end users is different from that of software developers. Els mentioned this:

"A process has a different meaning for end users that it has for developers and consultants. End users look at processes in a very detailed but often very narrow way. Mostly, they only know the part they are working with."

Second, not all wishes from end users are requirements, no matter how important they might be to the individual end user. Chris said about this:

"When an end user is asked how a system can be improved, he will probably tell you how his work on the system could be improved. There are need-to-haves and nice-to-haves. It is important that you have people in your workshop who know the difference and it is important for engagement managers to tell the difference."

A third issue mentioned in the interviews, is that it is important to set a few fixed occasions in which requirements can be changed.

"We organized a few workshops, and told everyone that these were the only moments during which they could give input for the requirements. Between and after these workshops, the requirements were frozen. If you don't do this, if you start working with loose notes and email messages, you will lose control over the process."

The engagement managers mention one other important reason for involving end users in the requirement process, and that is creating goodwill, which will eventually increase user acceptance of the IS.

A final note on this risk factor, is that incomplete requirements at the start of the project are not always a problem, according to the engagement managers. Erik explains:

"At the start of the project, the main objective was clear, and we had the requirements for the basis of the system. This meant that we could start building the system. The detailed requirements would come later."

CONCLUSIONS

Based on the findings that are discussed above, the following conclusions can be drawn:

- The differences between user participation modes applied in successful and unsuccessful projects is negligible;
- The focus of the user participation modes applied in mitigating the risk presented by incomplete/unstable requirements, lies on end users, as was expected based on the literature;
- In mitigating this risk, users are mainly involved through workshops;
- Projects can start with incomplete requirements; they can be filled in later on in the project.

4.2.7 ADDITIONAL FINDINGS

The interviews revealed some additional issues that should be kept in mind when applying user participation.

First of all, there is always a competition between the operational tasks of users and the development project. Users from the client organization cannot be expected to participation five days a week, when they also have their normal jobs to do. When users are asked to participate, they should be kept free of other work.

Second, many engagement managers stressed the importance of client intimacy, especially when involving senior management. Albert said about this:

"Engagement managers should invest time in building a good relationship with the management. Having them on your side makes life much easier; decisions are made faster and you'll get more work done."

Finally, user participation in modernization projects can be difficult. The new IS will most probably replace employees. Although these employees have a lot of knowledge that is useful to the ISD projects, chances are that they are not willing to cooperate or even want to frustrate the project.

4.3 DISCUSSION

This research set out to fill in the gap that was identified in IS literature on user participation in ISD projects. The literature that was reviewed for this research endorses the importance of user participation, but fails to describe when and how user participation should be applied. For this research, two research goals were defined; the first goal was to gain insight in the relationship between user participation and IDS project risk and the second goals was to construct a practical

model that can be used to determine how user participation can be applied to successfully mitigate ISD project risk.

4.3.1 THE RELATIONSHIP BETWEEN USER PARTICIPATION AND PROJECT RISK

As point of departure for this research, the contingency model for software project risk management by Barki et al. (2001) was chosen, and the five most prominent risk factors in ISD projects were identified. For each of these risk factors, a user participation mode was constructed that can be applied to mitigate the risk posed to the ISD project by that risk factor.

In order to validate the user participation modes, a survey was conducted among engagement managers at Capgemini, and a selected group of engagement managers was interviewed. In both the survey and the interviews, the engagement managers were asked how they applied user participation in their projects in order to mitigate risk, and what the results of these projects were in terms of perceived success.

The survey and interview results showed that the proposed user participation modes generally corresponded to the way the engagement managers applied user participation to mitigate project risk. The only exception that was found, was for the risk factor 'project size', where most of the surveyed engagement managers did not apply user participation at all. For the other risk factors, roughly the same people were involved in the same phases and for the same roles as in the proposed user participation modes. Although the survey and interview results showed a much broader approach of user participation (i.e. engagement managers also sometimes involved persons in phases and for roles which were different than described in the user participation modes), the set of user participation modes managed to provide a global description of the way user participation is applied to mitigate the risks assessed for this research, and therefore partially fill in the gap in IS literature on user participation.

4.3.2 THE APPLICATION OF USER PARTICIPATION IN RISK MITIGATION

A second issue that was studied in this research, is the relationship between the application of user participation and projects success. Many authors state that the application of user participation has a large positive effect on the success of the project. This research, however, show different results for the surveyed projects. The results show only a slight difference in terms of project success between projects where user participation was applied to mitigate risks, and those where user participation was not applied to mitigate risks. And when regarding the projects where user participation was applied to mitigate risks, almost no differences in applied user participation modes were found between successful and unsuccessful projects. This does not indicate that the proposed relationship between the application of user participation and project success does not exist; this research has only regarded user participation as project risk management technique, and then only focused on the largest risk factors. There are of course numerous other occasions in which user participation can be applied. The results of this research do, however, show that the relationship between user participation and project success is not as black-and-white as presented in IS literature.

There are two important notes that need to be made on these results. First of all, there can be more factors that define user participation than the three factors studied in this research (involved persons, type of user participation and depth of user participation). An example of such a factor, which was found in several interviews, is *client intimacy*. Of course, factors like client intimacy are hard to measure, but they can have a large impact on the effect of user participation. User participation can, in reality, be a much broader concept than defined in this research.

Second, there can be many other aspects that influence project success, besides user participations. This can also be concluded from the model proposed by Barki et al. (2001), where user participation is mentioned as just one of three dimensions of risk management, that can be used to mitigate project risk. User participation alone cannot be held responsible for a project being successful or unsuccessful.

Based on the above, it becomes clear that the user participation modes studied in this research, cover only part of the factors involved in user participation, and project success can therefore not be determined solely based on these modes. Because of this, there is no point in trying to construct a model for the successful application of user participation based on these user participation modes. The second goal of this research could therefore not be achieved.

4.4 LIMITATIONS

Although this thesis managed to provide a clear insight in the relationship between user participation modes and ISD project risk factors, some remarks have to be made on the research itself.

First of all, this research referred to project performance as a qualitative, single variable construct; a project could either be successful or unsuccessful. There were good reasons for this. First of all, taking into account different factors of project performance would result in an almost incomprehensible conceptual model. Secondly, the sample size for the quantitative part of the research was not nearly large enough to provide any significant results if not for a crude distinction between successful and unsuccessful projects, and finally, the time in which this research was conducted was limited. This approach, however, has two major drawbacks:

- Success becomes a subjective concept. A project that is regarded to as successful by one person, can be regarded to as unsuccessful by another person;
- Different projects cannot be compared based on performance. Two projects can be successful, but based on the classification used in this research, it is not possible to tell what project performed better.

Second, a remark can be made on the sample that is used in this research; the results are based on a limited set of projects. Due to time limitations, it was not possible to examine a large amount of projects, although this would have led to more significant results. The projects that were studied, are all projects executed by one single company, and information about these projects was only obtained from the consultants that managed these projects. This means that only the consultants' views on the projects were considered for this research. Since the

consultants' view on project success can be different from that of the customers, the research findings can be biased.

Third, for this research, the five largest risks to ISD-projects according to IS literature, were taken into account. This does not mean, of course, that these are the only risk factors that can be mitigated by the application of user participation. It also does not mean that these risk factors can be mitigated effectively by the application of user participation, as was shown for the risk factor 'project size'. The choice for these five factors was made simply because it is impossible to study all risk factors of an ISD-project (which, in fact are numerous), and including the largest risk factors would increase the implication of this research.

Finally, for the quantitative part of the research, a self-administered questionnaire was used. The amount of information that can be asked in a self-administered questionnaire is limited. Getting a more detailed image of the application of user participation by adding more questions to the questionnaire would have been beneficial to the research results, but would have made the questionnaire even lengthier than it already was. This would undoubtedly have a negative effect on the respondents.

Chapter 5

5 RECOMMENDATIONS FOR FURTHER RESEARCH

This final chapter will conclude the thesis by providing some recommendations for further research. Two sets of recommendations will be provided. The first set contains recommendations on how the quality of this research can be improved, while the second set contains recommendations on additional research topics in the field of user participation.

5.1 IMPROVEMENT OF METHODOLOGY

In the previous chapter, the limitations of this research were shown. Many of these limitations can be removed by improving the research methodology. Two recommendations for methodology improvements in future research can be given.

The first recommendation concerns the selection of a research sample. In order to get more significant outcomes, a larger sample should be used. The research sample can be increased by including other companies in the research. This will also reduce the effect of certain shared beliefs on user participation that can exist within one company. Bedsides consultants, the sample should also include the customers of the projects. Because consultants and customers have different stakes in the projects, their views on project performance can differ, and this might bias the results. Including both can prevent this bias.

The second recommendation concerns the method of data gathering. For this research, the participants were asked about their most and least successful project. The participants had to determine themselves what project whey would choose. This method of questioning results in data that can be subjective and only provides information about extremes (i.e. *most* successful and *least* successful projects). It would be better if the researcher would determine the successfulness of the projects, and not only include the most and least successful projects, but random projects. This will result in a broader and more complete view on ISD projects and their performance.

5.2 ADDITIONAL RESEARCH TOPICS

In future research on the topic of user participation, the conceptual model used for this research can be extended in several ways, in order to get both a broader and deeper understanding of the effect of the application of user participation on project performance

First of all, better attention can be paid on the project performance construct of the model. Additional variables can be added in order to make project performance measurable a quantifiable. This allows for a much more detailed analysis of the effect of the application of user participation on project performance. One suggestion would be to combine the conceptual model used for this research with the model of IS success introduced by DeLone & McLean (2003).

Second, additional risk factors could be incorporated in the research. For this research, only the five most prominent risk factors in ISD projects were taken into account, but there are of course many more risk factors that threaten ISD projects. A study on which risk factors can actually be mitigated with user participation can be conducted, the results of which can be used to determine how these risk factors can be mitigated. This allows for a broader understanding of risk mitigation with user participation.

The final recommendation would be to abandon the risk mitigation approach all together, and focus on other reasons why user participation can be applied in ISD projects. This research has assumed a risk-driven approach of the application of user participation. It is neither said, however, that the only reason for applying user participation is risk mitigation, nor is said that this would be the only way in which user participation would affect project performance. Many other occasions in which user participation can be applied might occur in ISD projects. Further research can be done on identifying other possible applications of user participation. The results of such research will provide a broader understanding of the concept of user participation.

6 REFERENCES

Avison, D. E., & Fitzgerald, G. (2006). *Information systems development* (4th ed.). Berkshire, UK: McGraw-Hill Education.

Barki, H., & Hartwick, J. (1989). Rethinking the concept of user involvement. *MIS Quarterly: Management Information Systems, 13*(1), 53-63.

Barki, H., & Hartwick, J. (1994). Measuring User Participation, User Involvement, and User Attitude. *MIS Quarterly, 18*(1), 59-82.

Barki, H., Rivard, S., & Talbot, J. (2001). An integrative contingency model of software project risk management. *Journal of Management Information Systems, 17*(4), 37-69.

Blili, S., Raymond, L., & Rivard, S. (1998). Impact of task uncertainty, end-user involvement, and competence on the success of end-user computing. *Information and Management, 33*(3), 137-153.

Brodbeck, F. C. (Writer) (2001). Communication and performance in software development projects [Article], *European Journal of Work & Organizational Psychology*: Psychology Press (UK).

CHAOS Chronicles (2003). West Yarmouth, Massachusetts: The Standish Group International.

Choe, J. M. (1998). The effects of user participation on the design of accounting information systems. *Information and Management, 34*(3), 185-198.

Cooper, D. R., & Schindler, P. S. (2003). *Business Research Methods* (8th ed.). New York, NY: McGraw-Hill/Irwin.

Davidson, E. J. (2002). Technology frames and framing: A socio-cognitive investigation of requirements determination. *MIS Quarterly: Management Information Systems, 26*(4), 329-358.

Davis, G. B. (1982). Strategies for information requirements determination. *IBM Systems Journal, 21*(1), 4 - 30.

DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean Model of Information Systems Success: A Ten-Year Update. *Journal of Management Information Systems, 19*(4), 9-30.

Doll, W. J., & Deng, X. (1999). *Should end-users participate as much as they want in the development of collaborative applications?* Paper presented at the Proceedings of the Hawaii International Conference on System Sciences, Maui, HI, USA.

Extreme Chaos (2001). West Yarmouth, Massachusetts: The Standish Group International.

Gallivan, M. J., & Keil, M. (2003). The user-developer communication process: A critical case study. *Information Systems Journal, 13*(1), 37-68.

Garrity, J. T. (1963). Top management and computer profits. *Harvard Business Review, 41*(4), 6 - 12.

Hardgrave, B. C., Wilson, R. L., & Eastman, K. (1999). Toward a Contingency Model for Selecting an Information System Prototyping Strategy. *Journal of Management Information Systems, 16*(2), 113-136.

He, J., & King, W. R. (2008). The role of user participation in information systems development: Implications from a meta-analysis. *Journal of Management Information Systems, 25*(1), 301-331.

Heerkens, J. M. G. (2001). *Inleiding Technische Bedrijfskunde - onderdeel: Methodologie*. Enschede: Universiteit Twente, facultiet Technologie en Management, dictaatnr. 360.

Heinbokel, T., Sonnentag, S., Frese, M., Stolte, W., & Brodbeck, F. C. (1996). Don't underestimate the problems of user centredness in software development projects - There are many! *Behaviour and Information Technology, 15*(4), 226-236.

Hsu, J. S. C., Chan, C. L., Liu, J. Y. C., & Chen, H. G. (2008). The impacts of user review on software responsiveness: Moderating requirements uncertainty. *Information and Management, 45*(4), 203-210.

Hwang, M. I., & Thorn, R. G. (1999). The effect of user engagement on system success: A meta-analytical integration of research findings. *Information and Management, 35*(4), 229-236.

Ives, B., & Olson, M. H. (1984). User Involvement and MIS Success: A Review of Research. *Management Science, 30*(5), 586-603.

Kidder, L. H. (1981). *Sellitz, Wrightsman & Cook's research methods in social relations* (4th ed.). New York: Holt, Rinehart & Winston.

King, W. R., & Cleland, D. I. (1971). Manager-analyst teamwork in MIS. Cooperation vital in systems design. *Business Horizons, 14*(2), 59-68.

Kirsch, L. J., & Haney, M. H. (2006). Requirements determination for common systems: turning a global vision into a local reality. *Journal of Strategic Information Systems, 15*(2), 79-104.

Kruchten, P. (2004). *The Rational Unified Process: An Introduction* (3rd ed.). Boston, MA: Pearson Education, Inc.

Lin, W. T., & Shao, B. B. M. (2000). The relationship between user participation and system success: A simultaneous contingency approach. *Information and Management, 37*(6), 283-295.

Lynch, T., & Gregor, S. (2004). User participation in decision support systems development: Influencing system outcomes. *European Journal of Information Systems, 13*(4), 286-301.

McKeen, J. D., Guimaraes, T., & Wetherbe, J. C. (1994). The Relationship Between User Participation and User Satisfaction: An Investigation of Four Contingency Factors. *MIS Quarterly, 18*(4), 427-451.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative Data Analysis: An Expanded Sourcebook* (2nd ed.). Thousand Oaks, CA: Sage.

Mingers, J. (2001). Combining IS Research Methods: Towards a Pluralist Methodology. *Information Systems Research, 12*(3), 240-259.

Moody, D. L. (2008). *Presentation on Survey Research (Information Systems Research Methods)*. Enschede: Twente University.

Mumford, E. (1979). Consensus systems design: an evaluation of this approach. In N. Szyperski & E. Grochla (Eds.), *Design an Implementation of Computer Based Information Systems*. Groningen: Sijthoff and Noordhoff.

Netherlands Court of Audit (2007). *Lessons Learned from IT-projects in Government - Part A (Dutch: Lessen uit ICT-projecten bij de overheid - Deel A)*. Den Haag: Algemene Rekenkamer.

Rondeau, P. J., Ragu-Nathan, T. S., & Vonderembse, M. A. (2006). How involvement, IS management effectiveness, and end-user computing impact IS performance in manufacturing firms. *Information and Management, 43*(1), 93-107.

Saleem, N. (1996). An empirical test of the contingency approach to user participation in information systems development. *Journal of Management Information Systems, 13*(1), 145 - 166.

Saunders, C. (2008). MIS Journal Ranking Retrieved 3 September, 2008, from http://www.isworld.org/csaunders/rankings.htm

Schwartz, R. B., & Russo, M. C. (2004). How to quickly find articles in the top IS journals. *Communications of the ACM, 47*(2), 98-101.

Steinbart, P. J., & Accola, W. L. (Writer) (1994). The Effects of Explanation Type and User Involvement on Learning from and Satisfaction with Expert Systems [Article], *Journal of Information Systems*: American Accounting Association.

Suri, H., & Clarke, D. (1999). Revisiting Methods of Literature Synthesis. Education Resources Information Center.

synthesis (2008). *Merriam-Webster Online Dictionary* Retrieved November 18, 2008, from http://www.merriam-webster.com/dictionary/synthesis

Wagner, E. L., & Piccoli, G. (2007). Moving beyond user participation to achieve successful IS design. *Communications of the ACM, 50*(12), 51-55.

Webster, J., & Watson, R. T. (2002). Analyzing the past to prepare for the future: Writing a literature review. *MIS Quarterly, 26*(2), xiii-xxiii.

Yetton, P., Martin, A., Sharma, R., & Johnston, K. (2000). A model of information systems development project performance. *Information Systems Journal, 10*(4), 263-289.

Yin, R. K. (2003). *Case Study Research - Design and Methods* (3rd ed.). Thousand Oaks, CA: Sage Publications Inc.

Appendices

7 APPENDICES

Appendix I: Survey

Appendix II: Survey results

Appendix III: Interview protocol

Appendix IV: Interview processing

APPENDIX I. SURVEY

This appendix provides an overview of the survey that was used for the quantitative part of the research. The survey was designed using Limesurvey, an open source, online survey tool. Personalized invitations and reminders were sent to the participants.

The survey is divided into two parts. The first part contains general questions about the participations, the second part contains questions concerning the projects.

Figure 7.1 shows the general questions.

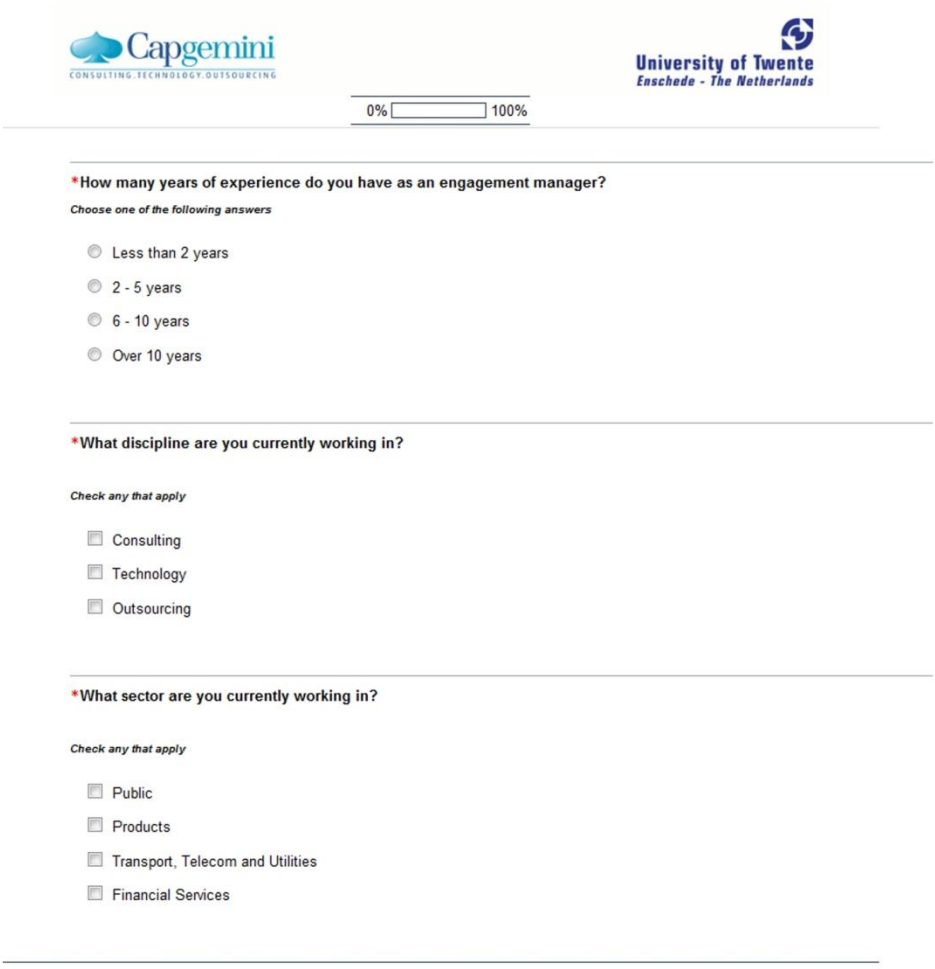

Figure 7.1: General questions

After the general questions, the participants were asked to think of two projects they had managed in the past; the most successful and least successful project, based on planning, budget and delivered functionality. For each of these projects, the project related questions shown in Figure 7.2 were asked.

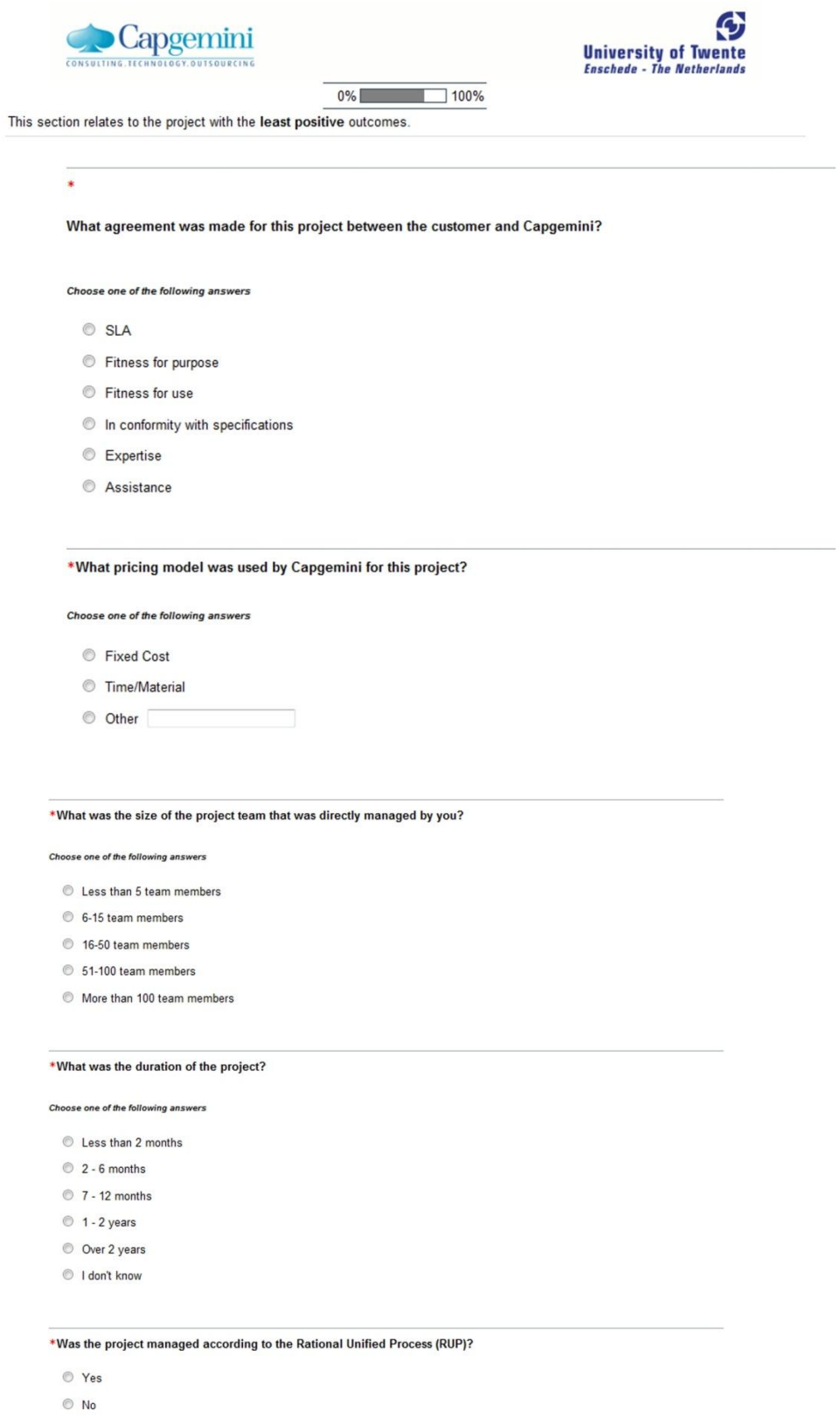

Figure 7.2: Project related questions

After these questions, the participants were asked about the presence of risk factors and the application of user participation to mitigate these risks. Examples of these questions concerning technical complexity are shown in

Figure 7.3. Conditional logics was applied to the survey, e.g. if the participant would answer 'no' to the first question shown in

Figure 7.3, the other questions would not appear.

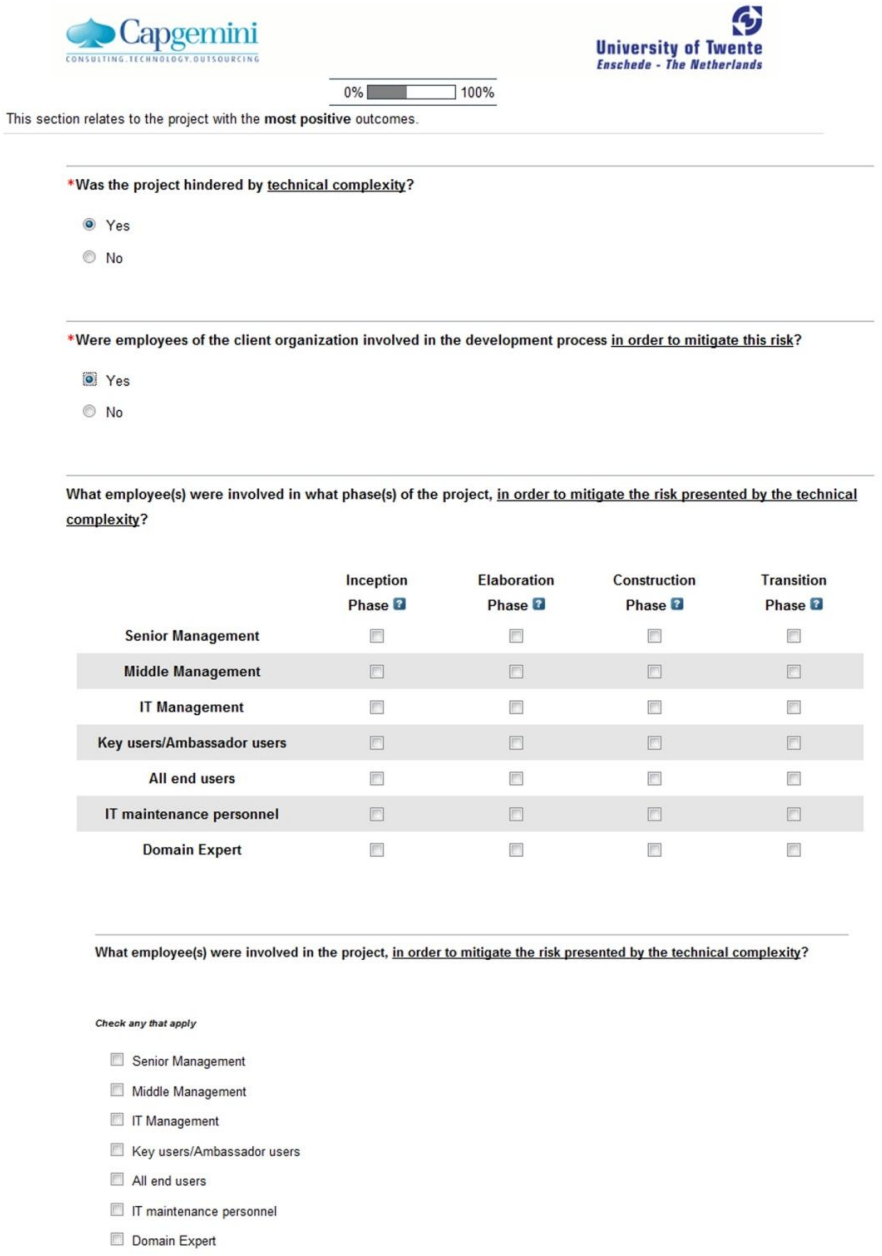

Figure 7.3: Risk related questions

APPENDIX II. SURVEY RESULTS

GENERAL STATISTICS

Respondents		
	Invited	Responded
Number of EM's	50	28
Level 1	68%	75%
Level 2	20%	11%
Level 3	12%	14%

Table 7.1: Respondents

Projects	
Number of projects	56
Successful	28
Unsuccessful	28

Table 7.2: Projects

Years of experience as EM	
Less than 2 years	0%
2 - 5 years	7%
6 - 10 years	29%
Over 10 years	64%

Table 7.3: Years of experience as EM

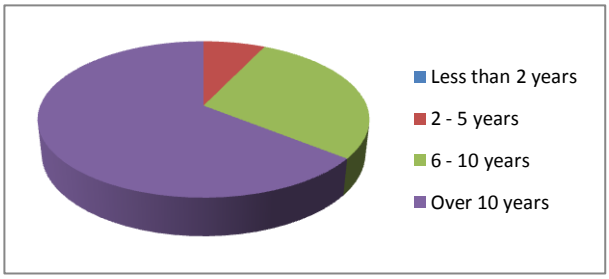

Figure 7.4: Years of experience as EM

Discipline	
Consulting	7%
Technology	90%
Outsourcing	3%

Table 7.4: Discipline

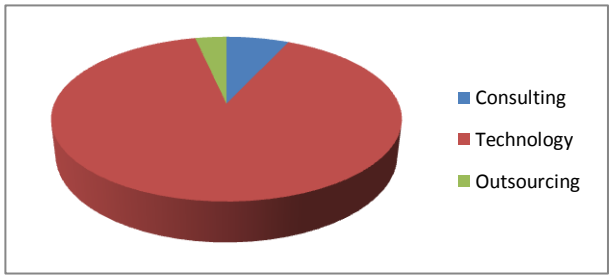

Figure 7.5: Discipline

Sector	
Public	23%
Products	16%
Transport, Telecom and Utilities	35%
Financial services	26%

Table 7.5: Sector

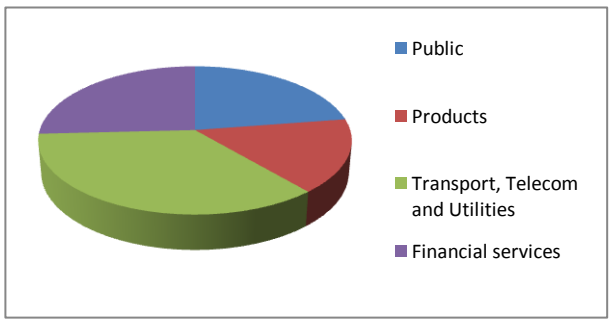

Figure 7.6: Sector

Agreement for project		
	Successful	Unsuccessful
SLA	4%	0%
Fitness for purpose	14%	11%
Fitness for use	29%	11%
In conformity with specs	29%	54%
Expertise	11%	11%
Assistance	14%	14%

Table 7.6: Agreement for projects

Pricing model		
	Successful	Unsuccessful
Fixed costs	36%	36%
Time/material	57%	57%
Other	7%	7%

Table 7.7: Pricing model

Project team size		
	Successful	Unsuccessful
Less than 5 members	7%	11%
6 - 15 members	54%	43%
16 - 50 members	21%	29%
51 - 100 members	7%	11%
More than 100 members	11%	7%

Table 7.8: Project team size

Duration		
	Successful	Unsuccessful
Less than 2 months	0%	0%
2 - 6 months	21%	21%
7 - 12 months	18%	32%
1 - 2 years	43%	25%
Over 2 years	18%	21%

Table 7.9: Duration

RUP applied		
	Successful	Unsuccessful
Yes	11%	11%
No	89%	89%

Table 7.10: RUP applied

EXPLANATION OF RESULTS PER RISK FACTOR

RISK PRESENCE AND UP APPLICATION

This section shows the amount of projects in which the risk factor was present, and the amount of projects with risk present, where user participation was applied to mitigate the risk.

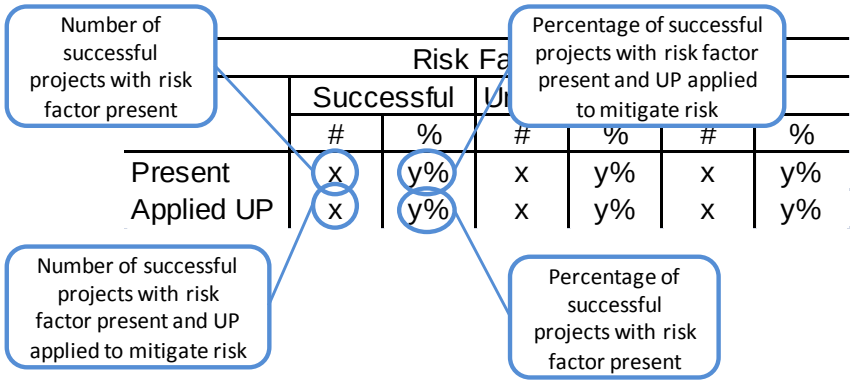

Figure 7.7: Risk presence and UP table

CORRELATION

The χ^2 value indicates the amount of correlation between the presence of a risk factor and project success. For a χ^2 value of 3.84 and higher, the correlation is considered to be significant.

APPLIED UP

The 'Applied UP' section shows what users were involved in the projects where user participation was applied to mitigate the risk.

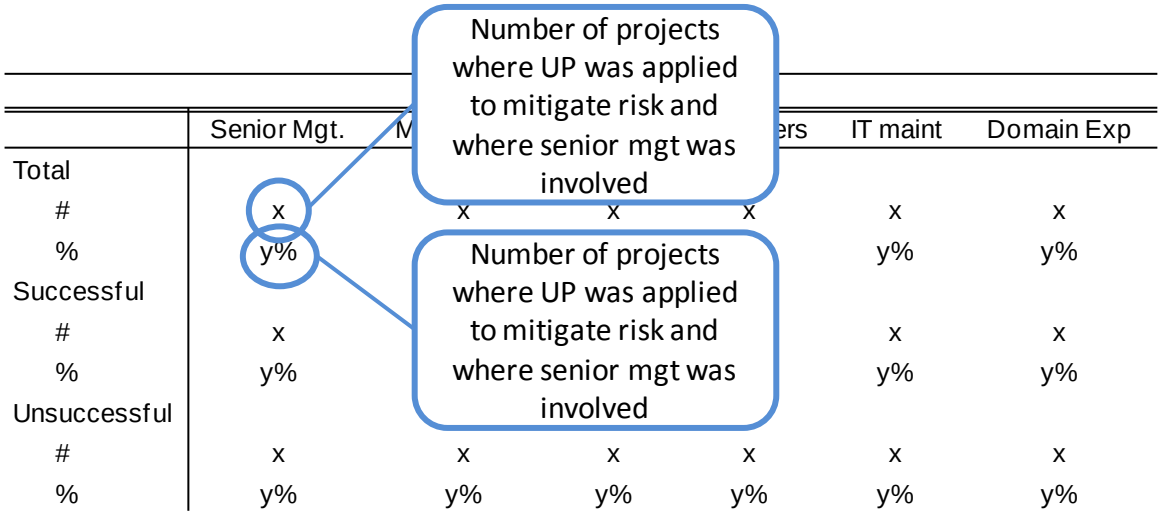

Figure 7.8: Applied UP table

TECHNICAL COMPLEXITY

RISK PRESENCE AND UP APPLICATION

Risk Factor: Technical Complexity						
	Successful		Unsuccessful		Total	
	#	%	#	%	#	%
Present	17	61%	19	68%	36	64%
Applied UP	16	94%	10	53%	26	72%

Table 7.11: Risk presence and UP - TC

CORRELATION

χ^2 value risk presence – success: 0.311. No significant correlation.

APPLIED UP

TC						
	Senior Mgt.	Middle Mgt.	IT Mgt.	End users	IT maint	Domain Exp
Total						
#	7	13	19	21	11	17
%	27%	50%	73%	81%	42%	65%
Successful						
#	5	8	11	13	7	11
%	31%	50%	69%	81%	44%	69%
Unsuccessful						
#	2	5	8	8	4	6
%	20%	50%	80%	80%	40%	60%

Table 7.12: Applied UP – TC

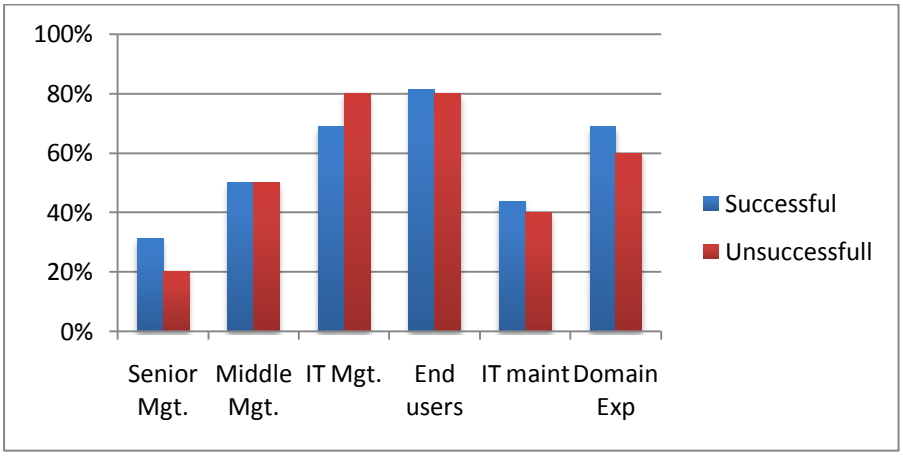

Figure 7.9: Applied UP - TC

ORGANIZATIONAL COMPLEXITY

RISK PRESENCE AND UP APPLICATION

Risk Factor: Organizational Complexity						
	Successful		Unsuccessful		Total	
	#	%	#	%	#	%
Present	20	71%	19	68%	39	70%
Applied UP	18	90%	16	84%	34	87%

Table 7.13: Risk presence and UP - OC

CORRELATION

χ^2 value risk presence – success: 0.084. No significant correlation.

APPLIED UP

	OC					
	Senior Mgt.	Middle Mgt.	IT Mgt.	End users	IT maint	Domain Exp
Total						
#	23	26	15	24	7	9
%	68%	76%	44%	71%	21%	26%
Successful						
#	13	16	9	13	5	4
%	72%	89%	50%	72%	28%	22%
Unsuccessful						
#	10	10	6	11	2	5
%	63%	63%	38%	69%	13%	31%

Table 7.14: Applied UP – OC

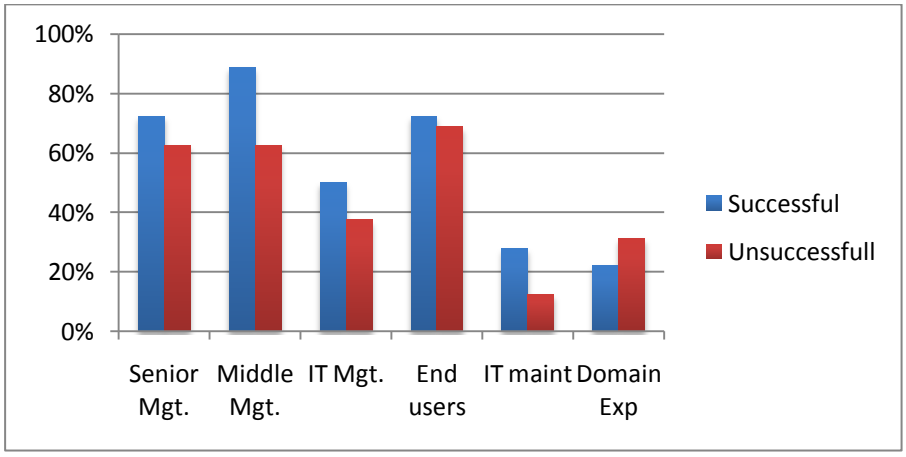

Figure 7.10: Applied UP - OC

PROJECT SIZE

RISK PRESENCE AND UP APPLICATION

Risk Factor: Project Size						
	Successful		Unsuccessful		Total	
	#	%	#	%	#	%
Present	7	25%	5	18%	12	21%
Applied UP	6	86%	2	40%	8	67%

Table 7.15: Risk presence and UP - PS

CORRELATION

χ^2 value risk presence – success: 0.424. No significant correlation.

APPLIED UP

PS	Senior Mgt.	Middle Mgt.	IT Mgt.	End users	IT maint	Domain Exp
Total						
#	3	6	5	4	2	3
%	38%	75%	63%	50%	25%	38%
Successful						
#	2	4	3	3	1	2
%	33%	67%	50%	50%	17%	33%
Unsuccessful						
#	1	2	2	1	1	1
%	50%	100%	100%	50%	50%	50%

Table 7.16: Applied UP – PS

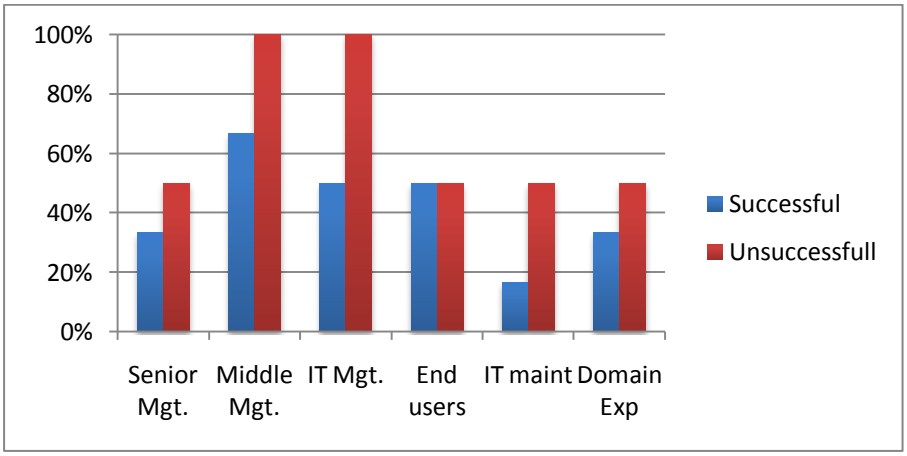

Figure 7.11: Applied UP - PS

OVERAMBITIOUS DEMANDS

RISK PRESENCE AND UP APPLICATION

Risk Factor: Overambitious Demands						
	Successful		Unsuccessful		Total	
	#	%	#	%	#	%
Present	11	39%	18	64%	29	52%
Applied UP	9	82%	10	56%	19	66%

Table 7.17: Risk presence and UP - OV

CORRELATION

χ^2 value risk presence – success: 3.504. No significant correlation.

APPLIED UP

OV						
	Senior Mgt.	Middle Mgt.	IT Mgt.	End users	IT maint	Domain Exp
Total						
#	8	12	8	11	4	6
%	44%	67%	44%	61%	22%	33%
Successful						
#	6	7	2	5	2	3
%	67%	78%	22%	56%	22%	33%
Unsuccessful						
#	2	5	6	6	2	3
%	22%	56%	67%	67%	22%	33%

Table 7.18: Applied UP – OV

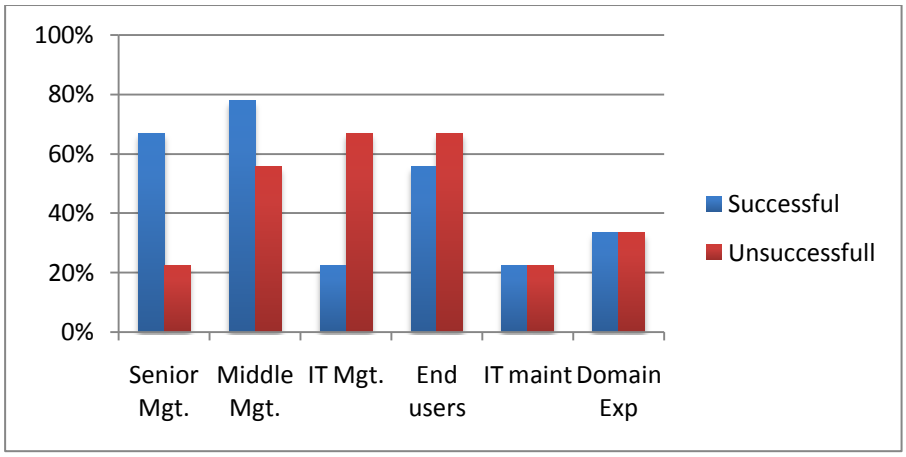

Figure 7.12: Applied UP - OV

INCOMPLETE/UNSTABLE REQUIREMENTS

RISK PRESENCE AND UP APPLICATION

Risk Factor: Incomplete/Unstable Requirements						
	Successful		Unsuccessful		Total	
	#	%	#	%	#	%
Present	19	68%	19	68%	38	68%
Applied UP	18	95%	16	84%	34	89%

Table 7.19: Risk presence and UP - RQ

CORRELATION

χ^2 value risk presence – success: 0.000. No significant correlation.

APPLIED UP

OV						
	Senior Mgt.	Middle Mgt.	IT Mgt.	End users	IT maint	Domain Exp
Total						
#	8	12	8	11	4	6
%	44%	67%	44%	61%	22%	33%
Successful						
#	6	7	2	5	2	3
%	67%	78%	22%	56%	22%	33%
Unsuccessful						
#	2	5	6	6	2	3
%	22%	56%	67%	67%	22%	33%

Table 7.20: Applied UP – RQ

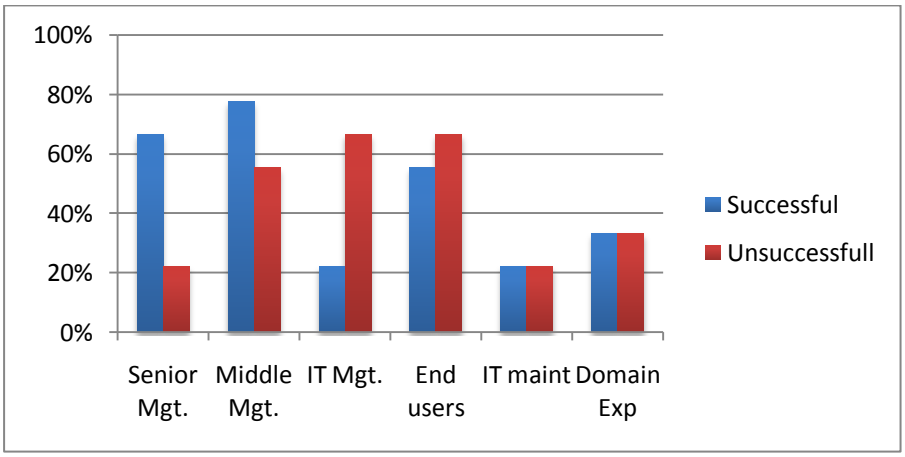

Figure 7.13: Applied UP - RQ

APPENDIX III. INTERVIEW PROTOCOL

This appendix shows the interview protocol that was used for the qualitative part of the research. The interviews were semi-structured and the survey design was used as guideline for the interviews. Like the survey, the interview questions can be divided into three sections; the first containing personal questions about the participant, the second containing general questions about both the successful and unsuccessful project, and the third containing questions specifically aimed at risk mitigation with user participation.

PERSONAL QUESTIONS

- *Can you tell something about your job?*
- *How long are you working for Capgemini?*
- *How long are you working as an engagement manager?*
- *In what discipline are you currently working?*
- *In what sector are you currently working?*
- *What is your EM-level?*

GENERAL PROJECT RELATED QUESTIONS

The interviewee is asked to think of the most successful and least successful project he/she managed as engagement manager. For both projects, the following questions are asked:

- *Can you describe the project?*
- *What was the duration of the project?*
- *What was the size of the project team?*
- *What agreements were made for the project?*
- *What pricing model was used?*
- *Was it managed according to RUP?*
- *Why was the project successful/unsuccessful?*

RISK SPECIFIC QUESTIONS

The interviewee is told about the five largest risks factors in ISD projects. For each risk factor, the following questions are asked:

- *Was the project hindered by the risk factor?*
- *In what way?*
- *Did you involve anybody from the client organization to mitigate the risk?*
- *Who did you involve*
- *Why them?*
- *How did you involve them, what was their task?*
- *When did you involve them and in what phase(s) of the project?*
- *Did this actually mitigate the risk?*

APPENDIX IV. INTERVIEW PROCESSING

In this appendix, the processing of interview results is explained. For the qualitative part of the research, interviews were held with six engagement managers at Capgemini. During the interviews, audio recordings were made, which were later used to write the interview transcripts.

The interviews were processed using QSR NVivo 7. The transcripts were loaded into the program and codified using a custom coding scheme. Since the survey was used as guideline for the interviews, and since the interview results were also used as part of the quantitative research, the survey questions were used in the coding scheme. NVivo allows the attachment of multiple codes to the same quote, so the survey questions could be chopped up into small segments. This resulted in the codes shown in Table 7.21.

Personal information	EM level	Experience
Discipline	Sector	Successful
Unsuccessful	General information	Project size
Project type	Pricing model	Agreements
Why successful	Why unsuccessful	Technical complexity
Organizational complexity	Project size	Overambitious demands
Incomplete/unstable req.	Risk presence	UP application
Who involved	Where involved	Why involved
Why not involved	How involved	Results of involvement

Table 7.21: Coding scheme

In NVivo, SQL-like queries can be constructed that return all quotes from all interviews containing the requested information. For example; when requesting information on who was involved in successful projects in order to mitigate the risk posed by technical complexity, entering the query "*coded by 'Technical Complexity' AND coded by 'Who involved' AND coded by 'Successful'*" will return that information.

Beside the codes that were selected based on the survey questions, some additional codes were added to the coding scheme. These codes were selected for topics that emerged during the interviews, but were not anticipated. Table 7.22 shows these additional codes.

Client intimacy	Depends on project	Availability of users
Methodology	Steering committee	UP in EM courses
Additional notes on UP		

Table 7.22: Additional codes