

# Evaluating as Designing

- **Towards a Balanced IT Investment Approach**

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To my father



## Abstract

The evaluation of information technology (IT) investments continues to present challenges to many organizations. While the emergence of new technologies complicates this activity, business value from IT typically resides with both tangible and intangible aspects. Managers today rely still on economic and financial methods when evaluating IT investments. In doing so, they tend to fail to understand how new IT systems affect the organization and its different stakeholders in ways that can have indirect yet significant impact on business performance. IS literature suggests therefore that interpretative evaluation approaches have to be enacted as to complement the traditional economic and financial ones. Such approaches view value as pluralistic and multifaceted, and evaluation is seen as a collaborative endeavor that involves multiple stakeholders. However, despite calls for integrative IS evaluation approaches, scant attention has been paid to innovative ways to combine the economic and interpretative perspectives. Addressing this knowledge gap, this thesis proposes ‘Evaluating as Designing’ (EaD) as a Meta IS evaluation approach. At the heart of EaD is the idea that by adopting a design attitude managers are able to balance these different perspectives. It suggests that managers must balance decision-making and sense-making to be able to tailor the evaluation activity to the specifics of the organizational context. To assess its effectiveness, EaD was applied through a collaborative practice research effort involving three public organizations. Building on the findings from this study, the thesis theorizes on the nature and role of IS evaluation in contemporary organizations. It also concludes with implications for research and practice.

**Keywords:** IS evaluation, IT investments, design attitude, collaborative practice research

## Acknowledgements

In order to take back my title as a chartered accountant (CA), after having worked as a financial manager for some years, I needed to return to the “world of academy”. When you leave your work as a CA you lose your title and then you must apply for it again. In doing so I found out that the rules for becoming a chartered accountant had changed. As my work had become more and more dependent on information technology, what could then be more suitable to study than Informatics. It was very interesting to come back to academia after several years of practical work as it gave structure to complexity. Therefore, my visit to the academia ended with a lot more than just the planned higher education credits, Master in Science of Informatics, and finally also a PhD in Informatics.

Being a PhD student was not only a challenge for me, I have also challenged others. Therefore, I would like to take the opportunity to show my gratitude to some people who have supported me during this journey in different ways. First, my special thanks to Frank Bannister, Sven Carlsson and Vibeke Ystad; your support in different ways has indeed meant a lot to me. Furthermore, I am indebted to the Management IT (MIT) Research School, which in 2007 admitted me as a PhD student. I would also like to thank my supervisor Jan Ljungberg and Rikard Lindgren, for their support and professional discussions. I am also grateful to Kalevi Pessi and Thanos Magoulas for inviting me being part of the IT management group and having courses on my own that have benefit my PhD. I am also most grateful for interesting and stimulating international collaborations with Narcy Roztocky, Quing Hu, Tero Päivärinta, Petri Hallikainen and Tom Eikebrook, thank you.

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Lokaa-samastha sukhino-bhavanthu,

Elisabeth Frisk,  
Gothenburg, February 2011

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# 1. Introduction

The complexity of evaluating information technology (IT) has increased over the years. The value of IT investment was first related to economic value since early applications that substituted manual data processing for computer data processing appeared rather straightforward to assess (Avgerou 2000). Today the picture of IT has become more complicated. The development of computing architectures has shifted from mainframes, to client-server, to TCP/IP and Internet architectures, and to services architectures (El Sawy 2003). This development has changed the nature of IT, to an artifact integrated within the business environment such that the business and IT are indistinguishable (Brown et al. 2009). One example is an ERP system comprised of integrated business modules executing a set of common functions. According to Carlsson (2007) many organizations are no longer viewing ERP as technical projects. This has led to new ways of managing IT in organizations, and an increased importance to understand and evaluate how IT investments succeed in achieving organizational value. Despite this development it is claimed that managers often disregard their responsibility due to the complexity and uncertainties surrounding IT investments (Weill and Ross 2004).

By the year 2000 more than half of capital expenditures in business, in developed countries, were related to the purchase of IT (Brown et al. 2009). Given that billions of dollars are invested in IT and related services each year, one would assume that managers' conduct thorough analysis when evaluating IT investments. However, when it comes to IT investment decisions, managers often rely on "gut instinct" or a simplistic benefit and cost analysis (Remenyi et al. 2007). According to a survey among Swedish companies conducted by Öhrlings PWC in 2008, 42% do not estimate their costs, 70% do not have a structured follow-up of their IT investments and 47% perceive that deficiencies in accounting exist (Jerräng 2008). Similar findings have been made in the UK, and the "leading" edge of IT has been described as the "bleeding edge" (Brown 2001). Derek Wyatt has reported that the wasted government spending on IT projects in the UK during the 1990's could have paid for at least fifty new hospitals (Brown 2001). The problems of IT investments were related to mismanagement and poor evaluation.

Managers evaluating IT investments mostly use a Business Case built around a Return on Investment (ROI) (Ward and Daniel 2006). This could be explained by the fact that ROI is part of the normal vocabulary and tool set of many managers, even non-financial managers. Attempts have been made to develop evaluation approaches that also involve stakeholders of the organization when evaluating the value of IT investment. For instance, Cost benefit analysis and methods such as Peng have been used to convert non monetary benefits of IT into monetary values - a process that is often arbitrary. Tracking the financial impacts of non monetary items converted into monetary values for cost benefit purposes are difficult. Indeed, the value of IT is changing and there are tangible and intangible paths to financial value that are of importance and must be understood (Kohli and Grover 2008).

In information system (IS) research much of the work on business value of IT investments concerns the relationship between IT inputs and economic outcomes (Kohli and Grover 2008). Several IS researchers have also argued that an economic approach is too mechanic, and suffers from a number of deficiencies such as limited consideration of the organizational context, neglecting human aspects of evaluation, and seeing information systems as a technical system and not as a social system (Jones and Hughes 2001; Serafeimidis 2001; Stockdale and Standing 2006; Ward and Daniel 2006). Interpretative IT evaluation approaches have therefore been put forward as one way to improve evaluation of IT investments (Jones and Hughes 2001). Such approaches consider evaluation as a social process, involves stakeholders that are affected by the IT, and also creates learning to the organization (Walsham 1999). However, the interpretative IT evaluation approaches have not to any great extent reached out to practitioners (Stockdale and Standing 2006).

Bannister (1999) has classified different types of IT evaluation into three basic evaluation types: fundamental measures (a single score), composite measures (such as Information Economics and Balanced Scorecard) and meta evaluation (focus on a specific context and the content and process of IT evaluation are not predefined). All three evaluation types can be applied in a positivist or a hermeneutic way. In the positivist way the methodology gives what is assumed to be an objective measure to the decision-maker. In the hermeneutic way the decision-maker combines different measures and information when evaluating. The attitude of the manager will determine what types of evaluation approach and what kind of information will be used. The fundamental measures are mostly used by the practitioners (managers) when evaluating IT investments (Ward and Daniel 2006). This can be explained by the fact that such measures are part of many managers, even non-financial managers' day-to-day vocabulary. Stockdale and Standing (2006) have argued that evaluating IT investments is a much more complex process than it might first appear. Indeed, they argue that the stakeholder and economic perspectives are equally important in such endeavors.

This thesis proposes 'Evaluating as Designing' (EaD) as a Meta IS evaluation approach that combines an economic and a stakeholder perspective. The approach suggests that managers can improve evaluation of IT investments by adopting a design attitude. Boland and Collopy (2004) originally developed the idea that a design attitude allows managers to balance these different perspectives. They argue that such an attitude, in contrast to a decision attitude, promotes a problem solving approach that involves inventing new alternatives rather than making rational choices. Such managerial behavior is particularly needed as business environments are becoming increasingly turbulent and chaotic.

## 1.1 Research Question and Objectives

The aim of this thesis is to improve managers understanding and evaluation of IT investments by developing and applying the EaD approach. This approach seeks to stimulate managers to adopt a design attitude when evaluating IT investments. It is based on the theory of managing as designing (Boland and Collopy 2004), evaluation theory (Guba and Lincoln 1999) and IS evaluation literature (Symons 1991; Jones and Hughes 2001, Stockdale and Standing 2006). This thesis addresses the following research question:

- *How and why can EaD help managers to improve evaluation of IT investments?*

The objective of this thesis is to extend the current understanding of IS evaluation and to assist managers in their efforts to evaluate IT investments in organizations. Being organized as a collaborative practice research project (Mathiassen 2002), my thesis project sought to develop EaD and assess its effectiveness in three public organizations.

## 1.2 Structure of the Thesis

This thesis consists of a comprehensive summary of the research project followed by five separately published papers. The first section includes the following chapters:

- **Chapter 2:** Theoretical Background. The main elements IT investment, evaluation, IS evaluation and Managing as Designing are discussed.
- **Chapter 3:** Evaluating as Designing. The theoretical model Evaluating as Designing and its different phases are introduced.
- **Chapter 4:** Research Approach. The research settings, Action Research, Collaborative Practice Research and the data collection and data analysis are described.
- **Chapter 5:** Research Summary. The findings of applying EaD and its different phases are presented. In each subsection the different papers related to the thesis are also presented.
- **Chapter 6:** Discussion. The findings of the thesis and contribution to both IS research and practice are discussed.
- **Chapter 7:** Conclusion. The conclusions of this thesis are presented.

### 1.3 Papers

The papers selected to be included in the thesis are direct outcomes of the different phases of EaD. Full-length versions of these papers are included in the second section of this thesis.

1. Frisk, E. and Ljungberg, J. (2009). The (Missing?) Value of IT in Public Organizations- The case of The Swedish Fire Rescue Services. European Conference on Information System (ECIS). Based on a paper conducted 2006, se paper 7.
2. Frisk, E. (2007). Categorization and Overview of IT Evaluation Perspectives – A Literature Review. European Conference on Information Management and Evaluation (ECIME).
3. Hu, Q., Frisk, E., Eikebrokk, R.T., Hallikainen, P., Päivärinta, T., and Nurmi, A. (2006). IT Investment Evaluation Why hasn't IT Become an Organization Routine? European Conference of Information System (ECIS). Nominated for best paper.
4. Frisk, E. (2009). From Business Case to Value Case – Assessing the organizational Value of IT Investments. European Conference of Information System (ECIS).
5. Hu, Q., Frisk, E., Eikebrokk, R.T. Hallikainen, P., Päivärinta, T. and Nurmi, A. (2007). IT Investment Evaluation as a Socio- Political Process: Determinants to use? European Conference of Information System (ECIS).

There are also other papers that have been written based on my thesis project. These papers have been important in that they allowed me to engage in discussions about the IS evaluation topic at different conferences.

6. Frisk, E. and Roztocky, N. (2005). The Effect of Stakeholder Consideration in IT Investment Evaluation on Business Value: Evidence from Sweden. American Management Conference on Information Systems (AMCIS).
7. Frisk, E. (2006) Obstacles for Achieving Benefits from IT-investments. European Conference on Information Technology and Evaluation (ECITE).
8. Hallikainen, P, Hu, Q., Frisk, E., Eikebrokk, R.T., Päivärinta, T., and Nurmi, A. (2006). The use of Formal IT Investment Evaluation Methods in Organizations: A Survey of European Countries. American Management Conference on Information Systems (AMCIS).
9. Frisk, E. (2008), Interpretative IT Evaluation in the Public Sector: Two steps forward and one backwards. European Conference on Information Management and Evaluation (ECIME)

## 2. Theoretical Background

This chapter gives a theoretical background to this thesis. In the first section IT investments and value of IT investments are discussed. This is followed by a presentation of IS evaluation approaches after which Managing as Designing is introduced.

### 2.1 Value of IT Investments

Gardner (2000) has described investment costs as capital outlays which create assets that support business activities for a long time. In general an investment can be defined as something requiring resources at one time and which will have consequences in the future (Andersson 1997). When calculating for an investment four components are of importance, benefits, costs, the discounted rate and the time period (McWatters et al. 2008), see Figure 1. Short-term investments mostly use a cost-benefits analysis while long-term investments (longer than a year) are critical to the organization and need careful control of the cash flows. According to the authors investments can involve tangible, financial or intangible assets. Tangible assets can be buildings and computers. Financial asset can be shares and securities. Intangible assets can be related to strategic investments such as research, product development, information systems, and education. Furthermore, investing can be motivated by different reasons such as reinvesting, obligations to invest and to create new possibilities (ibid). Reinvestments will not affect the existing capacity. Obligations mean one has to invest despite the consequences on the existing resources. New possibilities will create new opportunities for the organization. Gardner (2000) gives examples of different investments costs such as capital expenditures, capitalized intangibles and working capital. The capital expenditures consist of for example costs for equipment and installation. Capital intangible costs involve costs for software development, research and development, planning, and so on. Working capital is money tied up in receivables, inventory and elsewhere. Therefore, in order to be able to understand the economic and financial consequences of an IT investment, a comprehensive analysis of the investment impacts on the organization needs to be made.

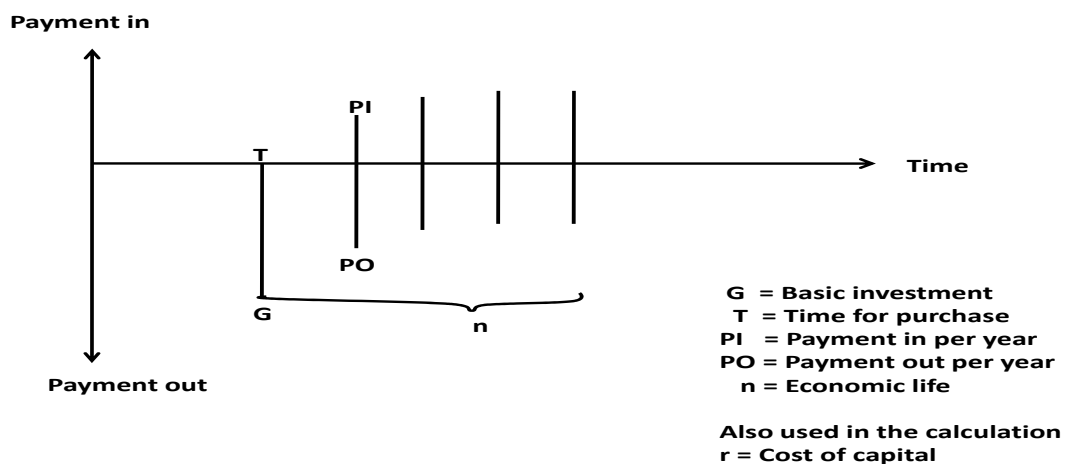


Figure 1. Calculating an investment.

In IS research Dedrick et al. (2003) have defined IT investments as investments in both computers and telecommunications, and in related hardware, software, and services. Avgerou (2000) noted that the economic value of IS was rather straightforward to assess with regard to IT applications that substitute manual data processing. However, it was soon realized that assessing costs and benefits of IT investments was too complex for traditional economic and financial investment appraisal techniques. This was motivated as not all benefits were easily quantifiable in monetary terms. For instance, IT investments can have different organizational effects such as affecting the organizations' structure, enabling organizational transformations as well as the implementation of strategy (Pearlson 2001). This kind of effects limits the capacity of traditional investment appraisal methods.

In management practice the traditional investment appraisal methods are still the most commonly used, particularly Return on Investments (ROI) (Ward and Daniel 2006). The ROI can be calculated in different ways and one simple calculation is to divide the investment profit by the cost. The capital budgeting methods focus on calculating cash flow in and cash flow out. The discounted cash flow methods also consider the interest rate (Danielson and Scott 2006). However, supplementary methods have been developed, such as economic value-added (EVA) and real option theory in order to take into account market price and return (McWatters et al. 2008). The traditional economic and financial methods mentioned above therefore consider the concept value based on exchange, when money for a product or services changes hands. According to Danielson and Scott (2006) does the concept value from this context focuses on shareholders' value.

The cash flow methods have been criticized for their inadequacy to appropriately evaluate intangible IT projects, which leads managers to select such projects on the basis of intuition and experience (Akalu 2003). Intangible benefits and qualitative aspects can be hard to measure and evaluate as they do not directly impact the bottom line of the income statement. The cash flow methods are also criticized as they neglect the timing issue of implementation when the environment is dominated by uncertainties (Akalu 2003). IT investments therefore only involve a potential for delivering value as they do not create value until they are in use. Then to predict the economic value of an IT investment can be difficult as the use of IT is not always within the control of the manager who makes the decisions about the IT investment. For instance, when implementing a web portal which allows customers direct access to the ordering system, the organization will be dependent on customers' approval of using the application. Therefore achieving value of IT investments is dependent on the users and the context in which the investments are to be used. In many cases it is not easy to explain the rationale for this mode of procedure (in economic methods). Furthermore, neglecting the economic and financial consequences of an IT investment in an organization can be considered as an act of carelessness. In fact organizations are restricted by the Accounting act and tax laws and therefore managers need to be in control of economic and financial data. Thus, when it comes to large investments, economic and financial methods give valuable information about how the investments will affect the organization in the future. However, these economic and financial methods are not sufficient on their own as they only provide the

decision-maker with economic and financial information and give no contextual understanding or information from the stakeholders affected by the IT investment.

Among academics in information systems, the definition of value of IT investments is far from universally agreed upon, as the word value is quite ambiguous (Remenyi et al. 2007). Bannister (2001) notes that the concept value has been ill defined and he considers that three different concepts, related to IT value can be distinguished: *Values* (with capital “V”), *value* and *benefits*. *Values* are norms or modes of behavior that individuals, groups or organizations consider right. They are visible in different cultural manifestations, in attitudes and beliefs, and in behavior. “*Value*” is then a “*quality applied to a good, service or outcome which supports, meets or conforms to one or more of an individual or group’s values*” (p. 3). Benefits can be seen as an operationalisation of the values. “*Value is what we perceive, benefit is what we receive*” (Bannister 2001, p. 3). Cronk and Fitzgerald (1999) put forward a multiple value perspective including upper, middle and user perspectives, and “IS business value” includes the uncorrelated dimensions system, user and business. Therefore, value of IT investments is a complicated construct that is hard to give an objective measure. From an organizational point of view value can be related to better use of resources (efficiency) and accomplish strategic goals (effectiveness).

Thus, the economic and financial methods support decision-makers with valuable methods in order to understand the economic and financial impact of an IT investment on the organization. However, in order to be able to calculate in a trustworthy way, a rather comprehensive analysis needs to be made in order to better understand the impact of the IT investments in the organization. In the next chapter IS evaluation will be discussed.

## **2.2 IS Evaluation**

According to Avgerou (2000) the capacity of traditional economic and financial investments approaches to assess the value of IT investments became too limited when IT became an enabler of intangible assets. New theoretical perspectives from the social sciences were then adopted in order to better understand the value of IT.

In social science, according to Alking (2004), evaluation is described as a multifaceted concept involving different types of evaluation that can be made for different purposes. The three main types of evaluation are: methods (measurement), use (description) and valuing (judgment). Furthermore, evaluation is considered to be either summative or formative. Summative evaluation is assessing in order to create information to sum up the merit, worth, and significance. Formative evaluation is described as improving and learning, to provide information that uses several methods and support evaluation continuously. Meta-evaluation is explained as the evaluation of evaluation (Alking 2004). Guba and Lincoln’s (1999) views on evaluation has been influential on some of the IS-research on evaluation. They called for an open-ended design of evaluation, stressing the importance of involving multiple stakeholders.

The research field of IS evaluation has been described as very fragmented and as a complex field of study as IS evaluation is a multidisciplinary topic and “*its scope is exceptionally wide ranging*” (Berghout and Remenyi, 2005 p. 89). Researchers of IS evaluation are still a long way from a generally agreed upon and accepted use of common concepts and to the outsider the research field looks rather disjointed (ibid). “*Evaluation may be defined as the act of comparing a process, an artifact, a person, an organization or any other situation with other comparable entities and/or with a set of standards which the evaluation regards as appropriate to that situation*” (Remenyi et al. 2007, p. 3). The two evaluation approaches that have received most attention in IS literature are the economic and financial methods, and the interpretative IS evaluation models (Berghout and Remenyi 2005).

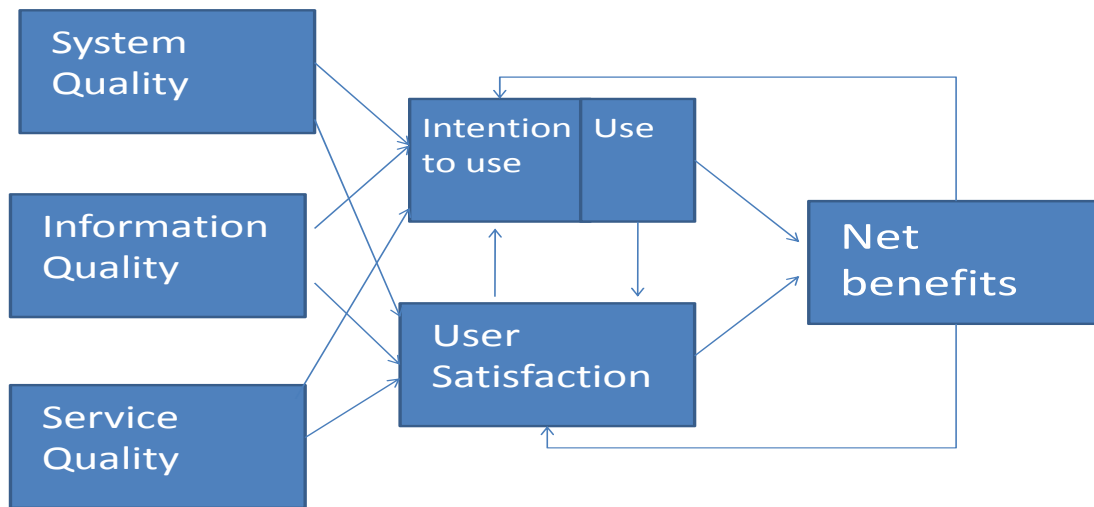
In IS research much of the work on business value of IS investments concerns economic measures and the relationship between IT inputs and economic outcomes (Kohli and Grover 2008). One of the most extensive discussions about Information Technology (IT) and its contribution of value is the IT productivity paradox. The productivity paradox was originally posed by Robert Solow (1987), who said that we see computers everywhere except in the productivity statistics. Brynjolfsson (1993) discussed the productivity paradox further from a the perspective of a firm and noted that the relationship between IT and productivity is little understood and that managers’ work to justify IT investments is particularly difficult as good quantitative measures are lacking. Willcocks and Lester (1996) reviewed the IT productivity paradox debate and found that the uncertainty about the IT pay-off relates to weaknesses and measurements of IT evaluation. In 1998, Brynjolfsson and Hitt wrote that the concept of productivity is easy to define but difficult to measure. Later on Dedrick et al. (2003) identified the profitability paradox as one of the priority areas for future research. These methods can be useful but hardly support the justifications of IT investments.

In IS evaluation also multi-criteria models are discussed. These models takes a step from simple measures of value to a multi-criteria perspective involving more perspectives than the economic. Examples are Information Economics and Peng. Parker and Benson (1988) presented Information Economics (IE), a justification tool for IT investments and provide a platform for comparing IT investment projects. The model includes a “two-domain model”, where value and costs are compared in the business contra the technology domain (Robson 1997). Peng was developed by Dahlgren et al. (2000) and focuses on benefits and costs, and in particular on how to make intangible benefits visible and translated into monetary benefits by involving stakeholders. It gives a ten steps solution for this.

One of the most cited IS evaluation models is DeLone and McLean’s (1992) IS Success Model that evaluates value of IS from a user perspective. The model is based on interdependent variables for achieving IS success including system quality, information quality and service quality that in turn affects the intention to use and the user satisfaction which then impact net benefits (DeLone and McLean 1992; DeLone and McLean 2003; Petter et al. 2008), see Figure 2.



## IS Success Model



**Figure 2.** DeLone and McLean IS Success Model.

Seddon et al. (1999) claim that DeLone and McLean's model is an important contribution to IS evaluation, but the model does not recognize that different stakeholders in an organization may come to different conclusions about the success of the same IT investment. The authors instead put forward the *Organizational IT Effectiveness* model, which describes value of IT investments from both a management perspective (relying on economic methods) and a user perspective (based on the stakeholders' perception of value). Furthermore, the model makes a distinction between different subjects of evaluation such as investments in IT generally (entire portfolio), an IT project or development methodology, a single application or type of application of IT and finally the IT function (IS department). Cronk and Fitzgerald (1999) criticized previous attempt to measure IS value, by using dependent and independent variables to measure value, and think that these attempts have unfortunately obfuscated a clear definition of organizational efficiency. The authors noted that there is a debate in literature as to whose value perspective should be accepted and the authors suggest a multiple value perspective including upper, middle and user perspective. The authors suggest a working definition of "IS business value" that includes the uncorrelated dimensions, system dependent, user dependent and business dependent. This implies that value of IS can be seen from different stakeholders' perspective.

The fact that the role of IS has changed has also contributed to an increased interest in perceptual measures of IT investments, and according to Chau et al. (2007) there is a shift in IS research from using objective measures to perceptual measures to study IS value. The interpretative IS evaluation approaches are therefore suggested that consider value pluralistic and IS evaluation is including a stakeholder involvement. Important concepts are content,

context and process as a base for evaluation (Symons 1991; Cronholm and Guldkuhl, 2003; Stockdale and Standing 2006). The *context* focuses on the question why, explains the reason for the IT investment and who will be included in the evaluation process (Stockdale and Standing, 2006). The *content*, what to evaluate, is an important factor in IS evaluation as it implies what to measure and is dependent on the perception of the stakeholders involved (Symons 1991; Stockdale and Standing 2006). However, what to evaluate is much more difficult than might be expected and Stockdale and Standing (2006) note: “*A decision on what is to be evaluated is a more complex process than might first appear and is significantly influenced by the stakeholders and by the context of the organization*” (p. 1092). The economic metrics are not part of the discussion of the content as that is the task of financial managers (Stockdale and Standing 2006). The *process* is described as formative and includes answers to the questions what is being evaluated and when the period of evaluation is (ibid). When it comes to the evaluation process of IT investments in general, Irani and Love (2001) think that there is a need to re-think the process as a life-cycle that seeks to provide decision-makers with an opportunity for reflecting and learning rather than a process that stigmatizes failure. Remenyi and Sherwood-Smith (1999) note that the IT evaluation activity is participative and involves a learning process, and what is learned in each phase should be carried forward into the next phase of the evaluation process.

Benefit Management has also received a great deal of attention in IS literature. Benefit management is defined by Ward and Daniel (2006) as “*the process of organizing and managing such that the potential benefits arising from the use of IS/IT is actually realized*” (p. 36). Due to the fact that most project models in use focus on costs, risks and processes, benefit management is considered to a complement to these models. These approaches include an iterative benefit realization process throughout the IT investments life-cycle. The purpose of BM is to give support to realizing the benefits of IT investments, to create awareness of new benefits identified during the process, and also to create learning to the organization (Ward and Daniel 2006). Furthermore, in BM attention is given to the need for changes and the fact that benefits are dependent on these changes.

To evaluate and follow up IT investments is not easy. Cronk and Fitzgerald (1999) note that IS evaluation consists of different levels of complexity. The first level addresses the question of “current value” of an existing information system. The second level explains why the value is what it is, or what factors influence the “IT business value”. The third level answers the question whether we should invest in IT and requires a multi-criteria approach. Consequently, depending on what kind of IT evaluation should be conducted managers should reflect upon what needs to be evaluated and how to proceed.

Boland and Collopy (2004) note that managers can improve their work by taking a step from a decision attitude to a design attitude. Instead of assuming that analytic tools with an economic focus represent the best “solution”, managers should approach problems with an array of influences that are both “profitable” and “humanly satisfying”. The next section introduces Managing as Designing, as discussed by Boland and Collopy.

## 2.3 Managing as Designing

Boland and Collopy (2004) address the problem of managers having a “decision attitude”. Managers have for decades embraced rational tools for approaching organizational problems, have operated under a cloud of self-interest and shortsightedness as their hallmark. The decision process has been supported by several different types of quantitative and non-quantitative methods and models. For instance, Porter’s Strategy Model or Kaplan’s Balanced Scorecard enables managers to handle extremely complex, ambiguous, and multifaceted situations. But they are constraints to generating new and different ideas.

Furthermore, today’s world is very much different from that of the 1950s when analytic tools started to flourish. A turbulent and chaotic environment of business needs something else than only quantitative methods and analytic techniques. According to the authors a decision attitude includes several constraints, for example:

- The target is stable and clear; the decision-maker has all the information needed and the solution is to be optimized.
- The analytic tools represent the problem in the best possible way for a solution of the problem.
- Only a few aspects of a situation are considered and that is not beneficial to the decision-making as humans have cognitive limitations.

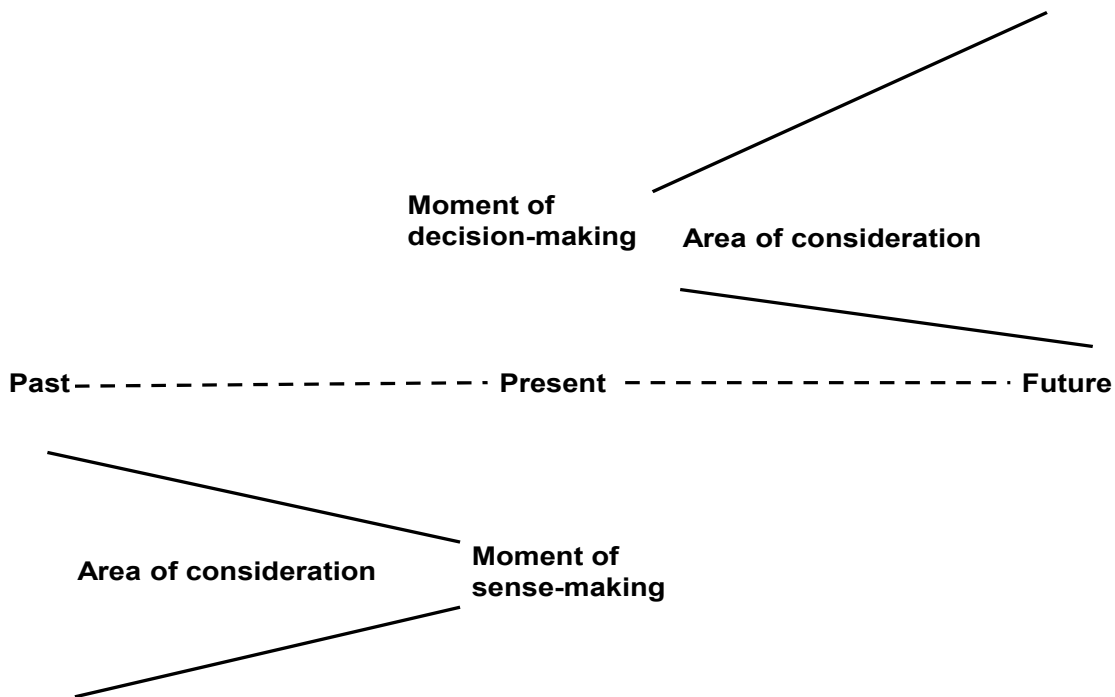
The authors instead propose a “design attitude” that approaches a problem-solving by considering, what we want to accomplish. The authors explain that if managers acted as the best designers, processes, products and services would be more functional and create better lasting value in society. A design attitude implies solving problems by trying to find the best answer possible, given the skills, time, and resources of the team, and this will require the invention of new alternatives (ibid). What must also be understood is the critical role that other actors than themselves play in realizing their designs as, with a few exceptions, *“either managers or designers are known for their commitment to and enthusiasm for a constructive engagement with the actors who will use the artifacts and realize the events shaped by their designs over time”* (Boland and Collopy 2004, p. 92).

Another important difference between the design and the decision attitude mentioned by Boland and Collopy is the vocabulary. A vocabulary, which forms a kind of language for the project, is a vehicle for creating dialogues across specialized professions, it achieves functionality, and uses many methods. The functionality, according to the authors, takes its starting point in efficiency and effectiveness, embodying processes, people and budgets.

The finest example of a design attitude, according to Boland and Collopy, is presented by Herbert Simon, who claimed that the role of managers was to act responsible and to transform existing situations into more preferable situations. The authors summarize Simon’s arguments thus: *“...humans have a limited cognitive capacity for reasoning when searching for a solution within a problem space. Given the relatively small size of our brains’ working memory, we can only consider a few aspects of any situation and can only analyze them in a*

few ways. This is also true for computers, although the constraints are less obvious. The problem space that a manager deals with in her mind or in her computer is dependent on the way she represents the situation she faces”. (p. 8-9). Simon also argues that a design has no final goals and strives to open up for a diversity of experience in order to make our design “humanly satisfying” as well as “economically viable”. Thus, Simon also, as Boland and Collopy, puts attention on involving both an economic and stakeholders perspective.

Later on Boland (2008) says that the design attitude as presented in *Managing as Designing* opens the scholarship on management to an expansive set of research opportunities that link decision-making and sensemaking. This can be motivated, as the author concludes, in order to change the way we try both to make sense of the situation and to plan for activities that improve the situation. According to Boland sensemaking and decision-making have different philosophical traditions but design as presented in *Managing as Designing* enables us to bring both traditions together. This matter for managers, being good at designing also involves being good at decision-making as decisions about for example processes, methods and costs are embedded within a good design outcome. Sensemaking is explained by Weick (1995) as focusing on an understanding of what we have done. Thus, *Managing as Designing* opens up for combining the views on what we have done (understanding) with the planning for how to change performance in the future, see Figure 3.



**Figure 3.** Different area of consideration in Sense-making and Decision making. (Inspired from Boland 2008)

Mintzberg (2009) also discuss design when describing the process of managers' decision-making. Furthermore, the author argues that controlling is an inevitable component of all effective management and leadership. Controlling as a management activity, according to Mintzberg, lost its status last decade but is back with a vengeance. In order to find out how managers "controlling" and get their job done, Mintzberg turns to decision-making. Decision-making is described as a design process involving following phases: defining the issue, developing courses of action and deciding the outcome. Around these stages there are different aspects of controlling. Examples of what managers' design are strategies, organizational structures, budgets performance, and so on. Mintzberg noted that decision-making is generally considered to be in the head of the decision-maker in organizations, usually the manager, but it is more than that. Therefore it is suggested that the attitude of managers needs to change. Managers need to manage with people instead of through information. That is to move one step closer to action. The concept manager is explained as the person who is responsible for the whole organization or for a unit and, who is held accountable for its performance. Thus, Mintzberg also think that the attitude of managers needs to change. He suggests managers to managing with people and that decision-making involving designing. This mean Mintzberg also consider it importance for managers to discuss with other stakeholders of the organization and not only rely on information provided.

Boland and Collopy describe a design process by illustrating architect Frank Gehry's approach to a design attitude. He works with multiple perspectives and multiple models. He starts by interviewing different customers about their image of improvements. The way the problems are represented is questioned, and the architect tries to go back to assumptions of importance to the project that have been invisible and unnoticed in the organization. The designer looks for real things that can be accomplished and look beyond the residue of years of organizational habit. Then, he looks for inspiration in other sources and suggests improvements. Next, he discusses the suggested improvements and interacts with the customers. The aim for Frank Gehry is to support the customers by putting forward ideas about new ways of using technology, a new work process, about changing calculations of cost and efficiency, and about making better solutions attainable at a lower cost. Different ways of thinking create better problem-solving outcomes. The outcome will be a draft for new solutions and for how to proceed. The draft is then adopted and adjusted to the context in which it is to act.

Frank Gehry also uses models that support the design process. For instance, the project was broken down into stages such as the feasibility study, definition of the program requirement, conceptual design, detailed design, construction drawings and finally into constructions. Each stage has a clear objective, leads to a specified outcome, creates a set of documents and brings in new ideas to the process. The approach becomes refined through iterations. The openness throughout the project is emphasized and is inspired by other sources. Each project creates an opportunity to ask what the real problems are and what the best solution (not optimizing) will be. Gehry was also committed to openness in his attempts to bring in influences from other domains during the project. Boland and Collopy suggest that a design attitude can be used in

any project that has a desire to experiment and do something differently and better than before. The authors say that the idea of managing as designing is not meant to be the end point, instead the question is how managers want to design.

Wastell (2010) argues that there is a great potential for IS-researchers to further explore managing as designing as presented by Boland and Collopy. According to the authors design matters for managers, but is not yet present in management practice or addressed in scholar writings about the managerial role. This gives IS-researchers an opportunity, since their knowledge base of design is more mature than in management research.

This thesis will use the idea of Managing as Designing as presented by Boland and Collopy and develop it towards an “IS evaluation perspective”. Managing as Designing will be discussed on the basis of IS literature when developing the idea of Evaluating as Designing (EaD). EaD is supposed to support managers to take a design attitude on a meta level and from a company level improve evaluating value of IT investments. Therefore the purpose here is not to apply EaD to each IT project but to apply it on a meta level and design an IS evaluation approach for a specific context. EaD will be introduced in the next chapter.

### 3. Evaluating as Designing

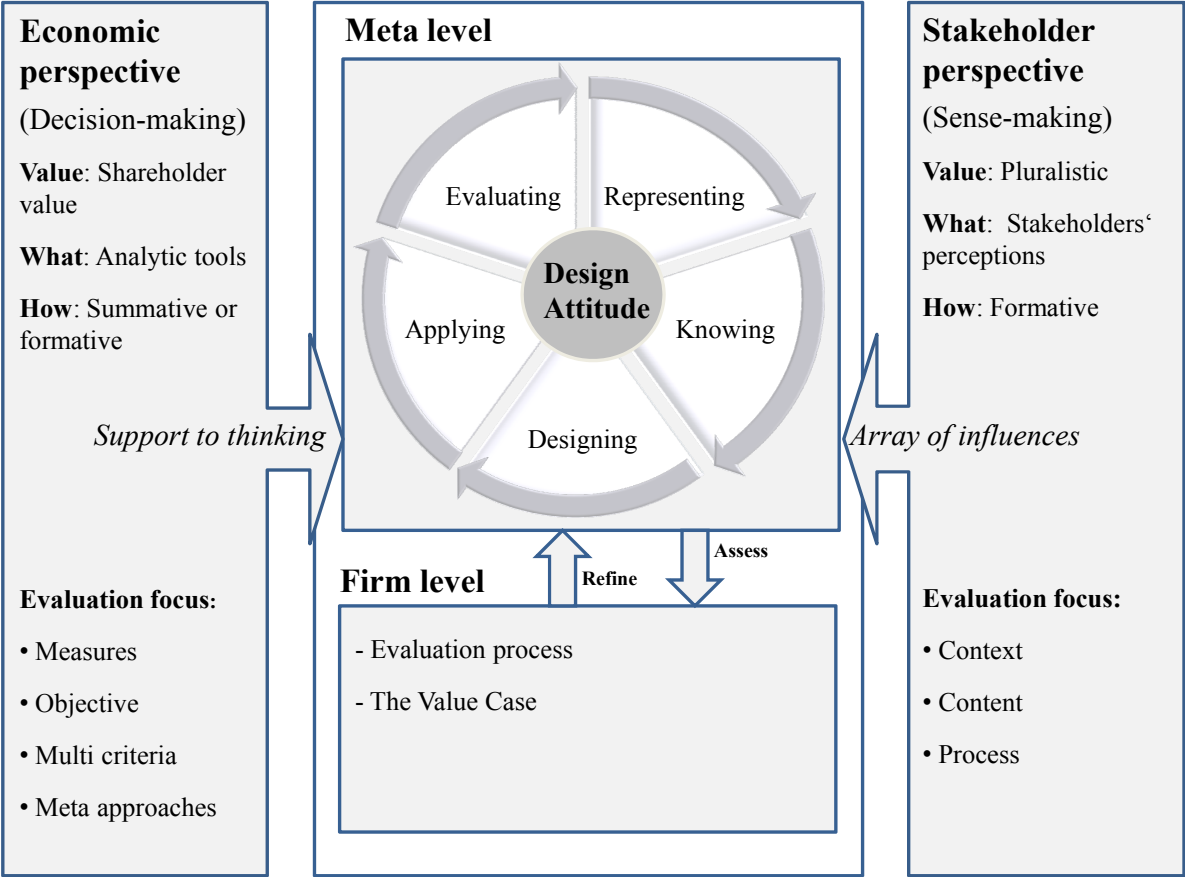
What characterizes the idea of *Managing as Designing* (Boland and Collopy, 2004) is that the authors give attention to a design attitude and that can support managers to accomplish value to the organization. Accomplish value by balancing the future oriented view including economic analytic tools with knowhow provided by the stakeholders involved. The authors try not to develop a new silver bullet (method/model) or a default representation for managers. This is most relevant for IS evaluation, as Seddon et al. (2002) noted that different stakeholders are affected differently by an IT investment and therefore have different perceptions of the value of an IT investment. In order to accomplish a design attitude Boland and Collopy draw managers' attention to the design process. The design process includes a problem-solving process that is "liquid and open" and involves stakeholders representing different roles and different levels of the organization. Furthermore, the experience of the stakeholders involved and prior knowledge (e.g. previous research and other methodologies/models/methods) interact in order to design a solution to the problem. The design process discusses the basic assumptions of the problem, questioning the basic assumptions and developing a vocabulary of design. Furthermore, the content is supported by analytic tools.

The EaD approach is based on the theory of *Managing as Designing* (Boland and Collopy 2004), evaluation theory (Guba and Lincoln 1999) and IS evaluation literature (Symons 1991; Jones and Hughes 2001; Stockdale and Standing 2006). EaD is addressed to IS professionals and managers evaluating IT investments that are responsible for evaluating IT investments or managers having the mandate or ambition to improve evaluation of IT investments. Carlsson's (2007) view is that the output of IS research not only concern IS professionals but also managers responsible for IS.

The EaD is represented by an framework that includes three parts such as the economic perspective, the design process and the stakeholder perspective, see Figure 4. The design process is based on the theory of *Managing as Designing* (Boland and Collopy 2004), but also includes ideas from the IS literature (Symons 1991; Jones and Hughes 2001; Stockdale and Standing 2006). The goal of the design attitude as presented by Boland and Collopy is to accomplish value from both an economic and a stakeholder perspective; therefore those two perspectives are represented in the EaD approach on each side of the design process.

The economic perspective is represented by its characteristics, its role (support thinking) and different evaluation types supporting IS evaluation from a decision attitude. The perspective supports therefore managers thinking of how evaluating the value of an IT investment on organizational level can be represented. The different types of evaluation are structured according Guba and Lincoln's (1999) description such as measurement, objective focus, and judgments. Examples of measurement are ROI, Pay-back, NPV and IRR (McWatters et al. 2008). Examples of objective focus are goal and system focuses (Symons 1991). Examples of models intended for judgments are of Information Economics, Balance Score Card (Robson

1997) and meta approaches. The purpose of categorizing different evaluation types is to clarify that the economic perspective can be represented in different ways. That can be useful as the complexity level of evaluation differs depending on what is to be evaluated. Cronk and Fitzgerald (1999) argue that evaluating IT investments is the most complex level of evaluation and therefore suggest a multi-criteria model. Thus, the more complex evaluation is the more information is needed and that indicates that evaluating IT investments by only using measures such as ROI and NPV is too limited.



**Figure 4.** Evaluating as Designing.

The stakeholder perspective is represented by the interpretative IT evaluation approach Content, Context, and Process (Symons 1991; Jones and Hughes 2001; Stockdale and Standing 2006). The focus is to create an understanding of value by considering the context, content (stakeholders' perceptions of reality) and the evaluation process as formative. Furthermore, the aim is to focus on the organization and create an increased understanding of changes that are required and that the value of the IT investments is perceived differently (Symons 1991; Jones and Hughes 2001; Stockdale and Standing 2006). The discussion of the context can include questions such as why and how and who affects the evaluation and how. The content includes the perceptions of the stakeholders involved regarding what should be evaluated when evaluating the IT investments. The evaluation process concern the question,



when is the period of evaluation when using a formative evaluation. A formative process implies to continually following up on the IT investment along the life-cycle and creating knowledge. Furthermore, to identify improvements of the organization not initially identified. Worth mentioning is that the EaD involves two different stakeholder groups. The design process involves the stakeholders of the organizations. Then the evaluation process on firm level is supposed to involve the stakeholders of the information system.

EaD is ideally executed as an iterative process where the organization over time improves its capability to evaluate IT investments so that they help leverage organizational value creation. In particular, this approach seeks to influence decision makers and IT managers alike to adopt a design attitude that:

- Represents IS value as balancing an economic and stakeholder perspectives.
- Organizes IS evaluation as a collective effort including stakeholders at multiple levels occupying different roles.
- Characterizes IS design at a meta-level activity.

The EaD process is based on the idea of Managing as Designing and IS literature and is described as follows:

**Representing:** In order to represent the problem area interviews are made with stakeholders from different levels of the organization and with different roles (Boland and Collopy 2004). The purpose of the interviews is to get increased understanding for the context evaluation should be conducted and to sum up different perceptions by the involved stakeholders. In order to get rich representations of the problem area the way the problem is represented should be questioned and stakeholders' perception of improvements has also to be understood (ibid). Furthermore, the designer tries to go back to assumptions of importance that have been invisible and unnoticed in the organization (ibid). The interpretative IT evaluation approaches also consider the understanding of contextual aspects of main importance (Stockdale and Standing 2006; Jones and Hughes 2001).

**Knowing:** According to Boland and Collopy (2004) the designer will look for inspirations in different sources that will act as a base for suggestions how to improve. This could be accomplished by being informed by prior knowledge, other projects, and other collaborative work. The focus is also on creating a common vocabulary. The IS literature and management literature have several frameworks, models and methods that can support the problem solving and understanding of complexity and, as Boland and Collopy (2004) express it, it should support thinking. Both the economic and interpretative perspective as represented in the EaD framework present some of the framework/models/methods that can support thinking leading to an increased understanding of the complexity that is not always easy to understand. Inspiration can also be achieved by other projects, collaborative work, and so on. The outcome can be a report or a model that illustrates the findings (ibid).

**Designing:** Next, the stakeholders will interact and discuss how to improve. The discussions should be based on the findings from the prior phases (Boland and Collopy 2004). This implies that it will be a balance between stakeholders' perceptions about reality and how to improve (get influences) and between established knowledge that is analytic tools and other sources of inspirations (support thinking). The role of the designer is to support the stakeholders in their thinking and presenting ideas about new ways to work (ibid). More variations of thinking (by including different stakeholders) will create better problem solving outcomes (ibid). The CCP approach also stresses the importance of stakeholders interacting in order to create an understanding of contextual issues that need to be considered (Symons 1991; Stockdale and Standing 2006; Jones and Hughes 2001). Therefore by balancing the discussion with support from methods and models from other different sources with the stakeholders experience, knowledge and perception of reality, a balanced solution may be accomplished. That is including both an economic consideration and stakeholders "betterment", as suggested by Boland and Collopy (2004). The main element of the economic and the stakeholder perspectives is described in the Figure 4.

**Applying:** The outcome of the prior phase can be a draft for new solutions and for how to proceed and that will act as a base for the solutions that will be adopted in a particular context (Boland and Collopy 2004). The preliminary solution is then supposed to be implemented or perhaps first adjusted to the context it should act. The solution in the design phase is labeled a preliminary solution, by the authors, as it will be followed up in an iterative design process, which is "liquid and open" (Boland and Collopy 2004).

**Evaluating:** The designer will follow up and reflect upon the outcome of the project by discussing and interviewing the stakeholders involved (Boland and Collopy 2004). Evaluating can create knowledge and that is a main issue in the formative IS evaluation (Symons 1991; Stockdale and Standing 2006; Jones and Hughes 2001). The EaD will be iterative as suggested and issues identified in the evaluating phase can be further discussed in the representing phase.

The EaD approach has been used practically in three public organizations in Sweden. This will be discussed in chapter five. In the next chapter, the research method will be described.

## 4. Research Methodology

This chapter includes the research settings of the research project, the research approach, the data collection and the data analysis, and finally the research criteria.

### 4.1 Research Settings

This study was based on me and three organizations in the Fire Rescue Service sector in Sweden. The study was part of a research project based on a formal agreement between the Viktoria Institute and the Swedish Fire Rescue Agency (SFRA) during the period 2005-2008. The SFRA is a government authority at a national level with expertise in different fields, including fire prevention. The study focused on improving evaluating IT investments at a company level. After the formal agreement between Viktoria Institute and the SFRA ended, it continued in 2008 as part of a PhD student post at the University of Gothenburg.

FRS was responsible for providing services such as prevention, preparation, and response for the municipalities in Sweden. The FRS organizations were structured either as a Fire Rescue Service (FRS) or a Fire Rescue Alliance (FRA) depending on whom they provided services for. For instance, a FRS provided services in one municipality and a FRA provided services in several municipalities (FRA). The FRS/FRA involved had different geographic locations and different sizes as that was a request from SFRA. Therefore, initially seven different FRS/FRAs located in different parts of Sweden were contacted and invited by email to take part in the research project. Two organizations did not answer. Three organizations showed interest (A, B, C). Two organizations (D,E) agreed to be involved in the initial interviews and to discuss the outcome. Therefore, this study involved one FRA and two FRS located in different parts of Sweden.

The FRS/FRA (henceforth called A, B and C) differed in several ways. For instance, organization A operated in a large city and was in alliance with several municipalities. Organization B operated alone in a large city. Organization C operated in a middle sized municipality and also acted alone. At each FRS/FRA five to nine managers, with different roles and from different levels of the organizations, were involved. The selection of the managers will be discussed later on. Furthermore, in organization A, I observed, for three days an operative crew involving twenty employees and I spent three days with the emergency service center. In total, six FRS/FRA were involved in different ways in this study, see Table 1.

Organization	Total Employees	Strategic Managers	Functional Managers	Operational Managers	Operational Employees
<b>0, FRS</b>	82	1	1		
<b>A, FRA</b>	1000	2	5	2	20
<b>B, FRS</b>	650	2	2	3	
<b>C, FRS</b>	150	1	2	2	
<b>D, FRS</b>	224	1	1		
<b>E, FRS</b>	307	1	1	1	

**Table 1.** Organizations and Managers involved in the Research Project

The type of application mostly discussed was a Fire Rescue Services Enterprise System (similar to the business organization's ERP system). The Enterprise System includes modules related to for example, accidents, planning of staff, and prevention. Two of the organizations involved used Daedalos/IKAROS, and one organization used Core. The FRS/FRA in Sweden did not to any great extent collaborate or coordinate their activities when it comes to the Enterprise System. Furthermore, SFRA did not recommend any Enterprise System to the FRA/FRS. Therefore, the choice of Enterprise System and how it should support the organization was up to each FRS/FRA.

The economic prerequisite for FRS/FRA was given by the confederation (Förbundsdirektion) which was composed of politicians from one or several municipalities. Within the FRS/FRA IT investments could be initiated during the budget process, during the year by any employees, and by someone outside the organizations such as SFRA. The decision-making of IT investments in the FRS/FRA was decentralized, and took place at department level unless the costs exceeded a specific amount, in which case the chief of the FRS/FRA was responsible. The business managers were therefore responsible for the decision-making of IT investments to be supported their department. Before the decision was taken by the chief of FRS/FRA, the IT investment was primarily discussed by the board. However, if the IT investment costs exceeded regular budget restrictions, it became a political issue and the decision was then taken by the local government committee, appointed by the local municipality.

The evaluation of IT investments, usually had, according to the respondents, a cost and technical focus. If the benefits were discussed it was mostly done from an individual perspective and not from an organizational perspective. In the cost calculations it has mainly the cost of hardware and software that was included. Thus the decision on IT investments was taken by both the business managers and IT managers. The amount of the IT investments determined at what level the decision was taken. The IT investments were evaluated before the decision was taken and the focus was the technology and on the costs of hardware and software.

## 4.2 Research Approach

According to Van de Ven (2007) “*many top journals have highlighted growing concerns that academic research has become less useful for solving practical problems and that the gulf between science and practice in a profession such as management is widening*” (p.2). The author claims that more insightful research can be done when researchers, users, practitioners, etc., are involved in the research process, instead of researchers or practitioners working on their own. In order to meet the dual hurdles of rigor and relevance a deeper form of research is needed that involves and engages both academics and practitioners and to a large extent builds bridges between practice and theory (ibid). How the concept relevance and rigor are defined is dependent on the context they are acting in. However, Van de Ven (2007) discusses relevance as useful to practice and rigor as knowledge related to scientific knowledge and relevant literature. Van de Ven also gives three examples of how the bridges between practice and theory can be improved. First, the knowledge transfer to practice can be improved. Second, taking a pluralistic view of science and practice can provide complementary insights for understanding reality as science and practice representing different kinds of knowledge. Third, if researchers started to produce knowledge in a better way as research is often an unengaged process of inquiry as the researchers typically study the research question without discussing the question with the stakeholders. Stakeholders can make important contributions in order to increase the understanding of the problem domain being investigated. Therefore Van de Ven puts forward Engaged Scholarship as a way to reduce the gap between practice and research. Engaged scholarship was defined by the author as a participative form of research that obtains different perspectives of key stakeholders in studying complex problems. This research project has chosen action research (AR) as a research strategy as the aim of AR is to collaborate with practitioners and accomplish improvement by change.

### Action Research

Action Research (AR) is described by McKay and Marshall (2001) as having dual aims. One aim is to solve practical problems and one aim is to test and generate theory. According to the authors AR includes two interlinked cycles. The first cycle relates to the researchers’ problem-solving interest and the second cycle is related to the research interest in action research. This means that the researcher is supposed to make improvements in a problematic situation and also to generate new knowledge by the activities. AR as a means can therefore enhance the skills and competence of both the researchers and practitioners (ibid).

Action research is collaborative and provides people with the means to take action in order to solve specific problems (Berg 2009). Organizational issues are studied together with those who experience these issues directly (Coughlan and Coughlan 2002). The desired outcomes of the action research approach are therefore not just solutions to the immediate problems. Important knowledge from both intended and unintended outcomes and a contribution to scientific knowledge is also desired (Coughlan and Coughlan 2002).

According to Berg (2009), the role of the researcher is to stand alongside the group involved in the project, to collaborate and contribute to expertise when needed. The author mentions three different types of Action Research:

- Technical AR, when the researcher identifies a problem after collaborating with the practitioners and then provides information to the practitioners on how to improve.
- Practical AR (PAR), when the problem is defined after the researcher and practitioners have assessed the situation and reached a mutual understanding. PAR seeks to improve practice and the practitioners involved reflect on their own style, incorporate new information by the research.
- Emancipating AR (EAR), an attempt to bring together theoretical knowledge with real world situations it assists the practitioners in order for them to better understand fundamental problems by raising their awareness. The EAR is characterized by theory, enlightenment and action.

This study has chosen a practical AR as the problems is defined after a mutual understanding. There are different action research processes presented in prior research such as Susman and Evered (1978), Checkland (1991), McKay and Marshall (2001) and Mathiassen (2002). The canonical action research (CAR), developed by Susman and Evered, is the classical and one of the more widely practiced and reported in IS literature (Davidson et al. 2004). CAR includes three different phases such as the entrance, the iterative and the exit. The iterative includes a cyclical five-step process: Diagnosing, Action Planning, Intervention, Evaluation (Assessment) and Reflection (Learning) (Davidson et al. 2004). This study has chosen a CPR approach as a way of organizing the study as CPR is also entering the problem situation in collaboration with the practitioners and then a suitable theory for solving the problems is selected.

When conducting action research the epistemological foundation for action research can be positivist, interpretivist, or critical (Klein and Myers 1999). This research project has chosen an interpretivist stance as reality and knowledge is considered to be socially constructed (Walsham 1995). Therefore theories and models can be seen as a way of making sense instead of objective facts. Also, *“what we call our data are really our own constructions of other people’s constructions of what they and their compatriots are up to”* (by Geertz 1973, in Walsham 2006). This research project is thus influenced by the fact that I have my knowledge base both in economics and informatics. Furthermore I have worked several years within the area of economics.

### **Collaborative Research**

The Collaborative Practice Research (CPR) process was chosen to inform this research project as proposed by Mathiassen (2002). CPR offers a way to organize and conduct research, based on collaboration between researchers and practitioners. Mathiassen (2002)

calls the CPR collaborative as it also opens up the possibilities for a pluralistic methodology in order to accomplish a useful balance between relevance and rigor.

The CPR approach involves two learning processes, a problem-solving cycle and a research cycle. The problem-solving process focuses on practice and the research cycle aims to contribute to the body of scientific knowledge. In the research cycle this CPR project uses the EaD approach as a way to contribute to the body of scientific knowledge. The practical problem-solving process tries to create an increased understanding for in what way the evaluation of IT investments (artifact) was improved and changed when evaluating IT investments. In order to learn about practice, Mathiassen (2002) described three different focus areas of CPR:

1. The authors developed their understanding of system development by interpretations of practice. The outcome is insights into practice, concepts and frameworks.
2. The authors design normative propositions that can support practice (artifact). The outcome is some type of artifact.
3. The authors focused on improving and changing practice by intervention and uncovering the deeply rooted assumptions and on learning about approaches to improvements. The outcome was to learn about practice and to get increased insights into barriers and enablers.

The focus areas of understanding, improvement and change were also used as important focus areas in order to better understand how to improve the evaluation of IT investments in practice.

Important in CPR is also to establish and maintain a good research-practice relationship in order to support the creation of relevant research results. This should be based on information and an in-depth insight into problems, challenges, and opportunities about the phenomena in study. At the same time produce rigorous and published results. This study established a good research-practice relationship by continually informing about and discussing the outcome of the research project. Furthermore, during the project, related papers to the project were published, see Chapter 1.3.

According to Mathiassen (2002), in CPR the researcher is dependent on how practice evolves, and the focus of the research outcome is not easy to control. CPR exemplifies the use of a pluralist research methodology by combining AR with experiments and conventional practice studies. In conventional practice studies, the primary focus is on understanding practice and that can be accomplished by interviews and surveys. In a pluralistic view diverse activities support can support each other and lead to a better understanding for the phenomenon investigated. Mingers (2001) advocated a plural methodology approach as a way to improve research as the research results will become richer and more reliable if several methods are used. Another positive effect of a pluralistic view is triangulation (ibid). Therefore this research project also used a pluralistic approach, see chapter 4.3. First the research process will be described.

## The Research process

This research process was organized and informed by CPR as described by Ivarsen et al. (2004). The nature and logic of CPR support the application of EaD. Therefore the structure of the research process will follow the phases of EaD. EaD was first developed and then tested in three organizations in accordance with the fundamental phases of CPR such as initiating, iterating and closing roles. In describing the research process the phases of EaD will therefore be used. The process, the content and papers published related to this research project are presented in Table 2.

CPR/EaD	Year	Fire Rescue Services	Papers
<b>Initiating</b>			
1. Representing. Appreciate problem situation.	2005	Semi-structured interviews and a field study were conducted in the three public organizations.	1.
2. Knowing. Study literature and participating in a complementary research project.	2005-2006	A literature review was conducted based on the issues identified in the first phase. A survey was also conducted aiming at a better understanding of why managers not to any great extent evaluate IT investments	2. 3.
<b>Iterating</b>			
3. Designing: -the content of evaluation -the process of evaluation	2006-2007	Two workshops and a final presentation of the result were held in each organization. The outcome of the workshops from each organization was: 1. A Value Case 2. An evaluation process	4.
4. Applying	2007	<ul style="list-style-type: none"> <li>• In organization A the Value Case was tested and used by the IT department.</li> <li>• In organization B the organization was forced to do drastic cutback and that took the attention from the research project.</li> <li>• In organization C the Value Case and evaluation were used at once.</li> </ul>	5.
5. Evaluating	2008 2009/2010	The result was presented to SFRA. Follow-up interviews were held at the organizations, A, B and C.	Thesis
<b>Closing</b>			
Exit, Assess usefulness, elicit research result	2011		Thesis

**Table 2.** The research process



The different phases of the CPR process 1-5 are similar to the phases of the EaD approach 1-5. Therefore, EaD has been influenced by the phases of CPR. The research process of the CPR project is described in chapter 5. In the next chapter the data collection and the data analysis will be presented.

### 4.3 Data Collection and Data Analysis

The managers involved in the research project were selected in organization A and B by the IT manager and in organization C by a manager responsible for the operative work. The study involved five to nine managers at each organization. The managers come from different levels and have different roles (see Table 3). A manager is someone who has an overall responsibility for the organization, the department, or for a unit (Mintzberg 2009).

	Organization A	Organization B	Organization C
<b>Strategic Manager</b>	Vice Chief Manager R & D Manager IT Manager	Chief Manager IT IT Manager	Operational Manager
<b>Functional Manager</b>	Department Manager Project Manager	Department Manager	Department Manager IT Manager
<b>Operational Manager</b>	Front-line Manager Firemen	Front-line Managers	Front-line Managers

**Table 3.** Managers’ position.

This study has been influenced by data from different sources such as interviews, observations, published data, workshops, a survey, project meetings, work meetings and documents, see Table 4. The data collection has been continuously documented.

Phase	Data collection			
Organization	A	B	C	D and E
<b>Initiating</b>				
<b>Representing</b>	9 interviews, 2 Observations (48 hours each). Project meeting	7 interviews  Project meeting	4 interviews  Project meeting	4 interviews
<b>Knowing</b>	One literature review and one survey were conducted. Documents in use were Project models, Ikaros project plan, Zered technical description, Plan for operative work etc.			
<b>Iterating</b>				
<b>Designing</b>	Two workshops and a final meeting. 4 interviews	Two workshops and a final meeting. 2 interviews	Two workshops and a final meeting. 1 interview	
<b>Applying</b>	4 project meetings,			
<b>Evaluating</b>	2 interviews	1 interview	2 interviews	2 interviews

**Table 4.** Data collection.

My interviews with the managers using semi-structured question lasted two hours. They were recorded, transcribed and analyzed. No coding tool was used, and Walsham (2006) notes that using a coding tool may demand too much attention itself so it is not always a necessary tool. Therefore the data gathering by interviews, observations and workshop sessions used open coding (Strauss 1987). This means looking for similarities and dissimilarities patterns in the data systematically. The interviews were analyzed by inserting the responses into columns in a table. In the left column the questions addressed to the respondents were listed down, one question per row. In the columns to the right the responses from one manager were inserted into one column. The table gave a good overview of the responses of each question. The analysis was performed by first reflecting upon the respondents' answers and then clustering these into similar themes. Similar themes were then collected into index sheets (Berg 2009). Then central issues were highlighted and different responses were connected to the different issues. First the responses within an organization were compared and then the findings were compared between the different organizations. The problems and possibilities put forward by the respondent were surprisingly similar. After the analysis was finished the findings were reported back to the managers in order to solve any discrepancies. A follow-up meeting was also arranged where the findings of the interviews were discussed. See also chapter 5.1 and paper 1.

During the time of the interviews also two observations were also performed. The first observation at the emergency service center was done during three days. A person in charge of the emergency calls was observed. Questions were also asked in order to understand the work process. The second observation meant spending three days with a fire crew. The observation was done with team firefighters at one fire station. During that observation I participated in turnouts, inspections of one under construction underpass and inspections of a finished forest fire. During the time questions were also directed to the firefighters and the team leader (20 people) such as their opinions of the role of IT, if IT supported their work and their perception of how IT investments were carried out in the organization. During the observations notes were taken when I could. The notes included subjective reflections from the observations and the responses from questions. The notes and questions were also analyzed by open coding as suggested by Strauss (1987).

Then, in order to create understanding for how to solve identified issues in the prior phase, a literature review was conducted. First a pre-study was conducted of other literature reviews conducted within the IS literature. Then searching for relevant papers first papers were selected by browsing key words in databases. Next step was to focus on the journals that seemed to have most interest for the topic IS evaluation. Following journals from 1996-2006 were selected: *European Journal of Information Systems*; *Information and Management*; *Journal of Enterprise Information Management* (earlier called *Logistics Information Management*); and *Electronic Journal of Information Systems Evaluation (EJISE)*. The papers were selected by browsing the following keywords: IS/IT investments, IS/IT evaluation, IS/IT effectiveness, IS/IT success, IS/IT assessment, IS/IT measurement, evaluation methods and IS/IT value. This review resulted in 105 papers. The content of the selected papers was then categorized into a table where the labels of the different columns were identification of the article, aim of the paper, research method, evaluation context, evaluation content, evaluation process and other comments of interest. Then each row included the findings from each paper. From this the identified factors and criteria and rational were categorized into a new table. See also chapter 5.2 and paper 2.

Based on an international collaboration, involving researchers from the USA, Norway and Finland I conducted and carried out a survey in Sweden. The question raised was, why most businesses do and IT managers believe IT investments is critical without conducting any formal evaluation. I emailed the survey to members of the “Dataföreningens panel”, which consists of members with different occupations related to IT. I sent the email to approximately 1,332 members identified as managers, CIOs, IT strategists, consultants and project leaders. In the end, a total of 320 responses were collected from the web site of which 312 were considered usable for data analysis, resulting in an effective response rate of 34%. In this study, a structural research model based on the theory of planned behavior (Ajzen 1991) was developed in an attempt to understand why using formal evaluation methods for IT investment projects has not yet become an organizational routine in a significant number of organizations across industries. Using survey data gathered from business and IT managers in Sweden, the reliability and validity of the measurement instrument was tested by Hu and then

the research hypotheses about the factors influencing the attitudes and behavior of managers towards using formal evaluation methods for IT investment projects were also tested. All the necessary steps in the measurement model validation and reliability assessment were conducted following the validation heuristics recommended for structural equation modeling.

Then, in the iterative part of the CPR project, two workshops and a meeting were held together with the informants from the part taking organizations. I was responsible for the meeting, and managed the workshops. Each workshop lasted approximately three hours and the meetings two hours. The workshop was opened up by me presenting the findings from the phases *Representing* and *Knowing*. The workshops then discussed the content (what should be evaluated), how the evaluation process should be performed, who should be involved and who should be responsible. During the workshops notes were taken and were visible to the managers. For instance, I wrote down different factors and criteria on a paper board. I also outlined the evaluation process discussed by the managers. After the workshops the notes were summarized and analyzed. Also here open coding as suggested by Strauss (1987) was used and an index sheet that put forward the identified factors and criteria. The evaluation process of each organization was illustrated by a flowchart. The comments of the managers on what should be evaluated and reflected upon (the content) were incorporated into an IS evaluation framework, later labeled the *Value Case* as it did not only include economic data as in Business Cases but multi perspectives. The evaluation processes suggested by the managers were illustrated by flow charts. After each workshop the Value Case and the flow chart were emailed back to each organization and to the involved managers. The purpose were to get feedback about corrections of discrepancies as care was taken to ensure that the findings were interpreted in accordance with the respondents' suggestions. After two workshops the Value Case and evaluation process were presented for each organization at a meeting. At the meeting the relevance of the Value Case and the developed IT evaluation process were discussed. Furthermore there was a discussion on whether the Value Case and the evaluation process were in the position to be introduced into the organization. The Value Case was also presented to managers at organizations D and E and it was received favorably. Both managers had the perception that the Value Case could be used when analyzing other investments than IT investments. See also chapter 5.4 and paper 4.

A second analysis of the first survey was conducted. From the theoretical perspective that IT investment evaluation is more a social than a technical process, our attention moved to the socio-political perspectives. We adopted the stance from above that IT investment evaluation is not simply an issue of methods and mechanisms, but a consequence of interactions between organizational power, politics, and human understanding of the benefit and cost of conducting formal evaluations. This study builds on prior research that puts the human agency at the center of the IT investment evaluation phenomenon, as opposed to the technicality or mechanism of evaluation in the traditional approach. A research model is developed and hypotheses based on the extant literature and present the results of structural equation modeling using survey data collected from organizations in Sweden across various industries

and size. A discussion on the implications of the findings and future research directions is also presented. See also chapter 5.5 and paper 5.

The final interviews conducted in the phase of *Evaluating* were semi-structured and lasted for two hours. They were recorded, written down and analyzed. No coding tool was used, and Walsham (2006) notes that using a coding tool can draw too much attention itself so it is not always a necessary tool. Also here open coding (Strauss 1987) was used as mentioned above. The responses were structured and similarities and dissimilarities were looked for. In this case the perception among the managers varied, see chapter 5.5

Other data were also collected from the organizations by participating at work and project meetings. For example documents such as project plan, supplier documents, other internal documents related to the existing IS from the suppliers and notes from meetings were also part of the data collection. In table 2 the data collections in the research process as a whole are presented.

#### 4.4 The research criteria

According to Ivarsen et al. (2004), AR seeks relevance to practice in their results. This can, according to the authors, lead to a number of pitfalls such as lack of impartiality of the researcher, lack of discipline, mistaken for consulting and context dependency leads to difficulty to generalize the findings. Therefore, the authors put forward a set of criteria to ensure both relevance and rigor in the carrying through of the CPR project. Rigor is by Davidson et al. (2004) explained as the correct use of methods and analysis. Relevance is described by the authors as not only being of relevance to practice but it should also be evident how the result can be implemented. Ivarsen et al. (2004) followed Davidson et al. (2004) and formulates the criteria as a set of questions:

- **Roles:** What are the researchers' and practitioners' roles and how do they develop over time?
- **Documentation:** What data are collected to support the problem-solving and research goals; how are these data collected; and how is data quality ensured?
- **Control:** How is the researcher-client relationship established; who exercises authority over the process; and to what degree are formal control mechanisms adopted?
- **Usefulness:** How useful is the solution established in the problem situation?
- **Theory:** How are frameworks used to support the study; and how are the results subsequently related to these frameworks?
- **Transfer:** Under what conditions can the results be transferred to or adopted in other contexts?

**Roles:** My role in this study was to be responsible for the project and directed the project to its goals. The practitioners contributed with their contextual understanding, their knowledge and with their experience. Our roles did not change over time. One manager described my role as building bridges between theory and practice.

**Documentation:** How different sources of data have supported problem-solving and research goals is presented in chapter 4.3.

**Control:** The researcher-client agreements were established after the interviews. Then, a project meeting was held at each organization where the project plans including the goal, aim, research question, the outcome of the interview and how the research project should proceed were discussed. The roles and different areas of responsibility for me and the managers were clearly stated. We then agreed upon the project plan as suggested in the research project.

**Usefulness:** The usefulness of the research project was established in the initial discussions in the phase *Representing*. The managers agreed upon that the evaluation of IT investments needed to be improved, and to design a formalized IS evaluation process would support IS-evaluation. An IS evaluation approach was suggested as the managers acting at FRS/FRA lacked on knowledge and understanding how to improve IS evaluation. Evaluating IT investments needed therefore guidelines. Furthermore, the solution was positively received as the managers involved have had the possibility to affect the solutions. During the research project I also presented each year the outcome of the research project to a reference group that discussed the progress of the research project. The reference group involved three researchers from the academy, four practitioners from different FRS's in Sweden, and one person was representing SFRA. The perception of one manager from the FRS/FRA was that this research project was very important for the FRS/FRA as the organizations were lacking knowledge how to improve IS evaluation.

**Theory:** Theory has continually guided the research activities. Two specific literature reviews have been conducted. First, a literature study was conducted in order to support the development of EaD. Secondly, a literature review of IS-evaluation literature yielded information how to improve IS evaluation (the artifact) in practice. The Value Case built in all three organizations has its base in the IS-evaluation framework presented in chapter 5.2.

**Transfer:** How useful EaD is in other settings cannot be assessed. However, the idea of the EaD is rather generic and the use of EaD should not be blindly. Hopefully the EaD approach can inspire managers to take a design attitude and get increased understanding for how an economic and stakeholder perspective can be balanced in a design process. The next question is then, if the outcome of the EaD, the Value Case and the evaluation process can be transferred to other organizations within the same line of business. The Value Case was favorable received in the organizations D and E involved in this research project. Therefore, I think it seems reasonable that the meta Value Case developed by the involved organizations can support other managers thinking in other Fire Rescue Services organizations. The evaluation process is dependent on how the organization is organized and can therefore not be transferred, but can be a source of inspiration.

## 5. Practicing Evaluating as Designing

This section will present how Evaluating as Designing (EaD) was introduced at three public organizations and how EaD could support the organizations evaluating IT investments. The different sub-sections in this chapter follow the phases of EaD. In Table 5 is illustrated how the papers included in this thesis are related to the different phases of EaD.

The Phases of EaD	Published Papers
<b>5.1 Representing</b>	1. Frisk, E. and Ljungberg, J. The (Missing?) Value of IT in Public Organizations – The case of The Swedish Fire Rescue Services.
<b>5.2 Knowing</b>	2. Frisk, E. Categorization and overview of IT Evaluation perspectives - A literature review. 3. Hu, Q., Frisk, E., Eikebrokk, R.T., Hallikainen, P., Päivärinta, T., and Nurmi, A. IT Investment Evaluation Why hasn't IT Become an Organization Routine?
<b>5.3 Designing</b>	4. Frisk, E. From Business Case to Value Case - Assessing the organizational Value of IT Investments.
<b>5.4 Applying</b>	5. Hu, Q., Frisk, E., Eikebrokk, R.T., Hallikainen, P., Päivärinta, T. and Nurmi, A. IT Investment Evaluation as a socio- political process: Determinants to use?
<b>5.5 Evaluating</b>	Not published material and presented in this section.

**Table 5.** How the papers in this thesis are related to the phases of EaD.

### 5.1 Representing

The phase *Representing* aimed to create increased understanding of the context IS evaluation was supposed to be improved. Therefore, experienced managers of IT and IT investments (in most cases) from different levels and with different roles, within each organization, were interviewed. The questions asked were e.g. how IT evaluation is conducted, central concepts, perceived problems, challenges and improvements. During 2005 the interviews were conducted at organizations A, B, and C. In addition, three days of observations with a fire crew and three days at the emergency work center were done. On the basis of the findings from the interviews and observations, a project plan for each organization was drawn up. The project plan first presented the background, aim and objective of the project, then the findings of the observations and interviews, and finally a proposal for how the EaD could continue by making explicit what the different phases would involve.

Findings from the interviews and observations were that managers' perception of value of IT investments varied with organizational level. For instance, managers at the top level related value of IT investments to cost reduction. The IT managers related value of IS to the achievement of goals and strategy of the organization, to effectiveness and to efficiency. At departmental level, managers related value of IS to obtaining better information that could act as a base for improved analysis of the organization's performance. On the operational level, several firemen related value of IS to their ability to extinguish fires.

The identified problems of evaluating IT investments could be related to how the managers perceived the concept of value. For instance, one top manager (B) discussed the difficulty in calculating the costs of an IT investment properly. Often the expected cost reduction faded away as there were other unexpected costs which reduced the expected cost reduction. At departmental level, managers at organization A and B had problems with evaluating the benefits of IT investments. On the operative level both the team leader and several firemen were frustrated by previous investments in IT. For example the application supporting the registration of turnouts was by the team leader considered as too complicated and time consuming. The application was supposed to be used in the same way irrespective of whether the turnout concerned a fire in a wastebasket at a school, or a large fire in several buildings, or a chemical accident. According to the team the users of IT investments were seldom involved in the evaluation of IT investments. Identified problems by the managers are presented in Table 6.

Several of the other problems raised by the managers during the interviews could be related to efficiency (doing things right) and effectiveness (doing the right things), the tasks of management. To consider effectiveness is particularly important in the public sector as it is driven by political goals and not by the "bottom line". Furthermore, the usefulness of an IT-investment to the organizations should be in the foreground, not the value of technical features of the system. Another reflection was that the organizations acted very much in the same way, they had the same vocabulary at the same level of the organization, and the managers identified the same issues.

The findings in this phase support that both an economic and a stakeholder perspective are needed. Evaluating IT investments from an economic perspective with monetary items will continue to be an important perspective. The problem here is that the economic approaches are general, and not developed for specific use in IT-investments. The concept IS value need further clarifications. The calculation of cost in these methods must be further developed. The interpretative IT evaluation approach (stakeholder perspective) could contribute positively to the IT evaluation process in the public sector since it considers strategic issues, co-ordination, stakeholders' involvement and views evaluation as a formative process. Another issue that needed further attention was how to take care of power and politics in the IS evaluation process.



Issues	Managers' perceptions
<b>IT value pluralistic</b>	The perception of value differs between different organizational levels. For instance on strategic level IT is described as a cost rather than delivering value. Several managers emphasized the importance of seeing value from an organizational point of view and also related to the citizen. The opinion among several firemen were:  <i>"You cannot fight fires with computers"</i>
<b>Absence of strategy.</b>	Managers from all organizations perceived that their organizations were lacking strategy from the organization as well as for IT. They suggested that the goals of the organization should direct the choice and decision of new IT investments. For instance: <i>"We don't know the plans for the coming two years, which means that the persons who are most anxious for new IT investment get their requests approved."</i> (OM C).
<b>Value of IT, narrow perspective.</b>	The IT investments were perceived in all three organizations to be based on a cost and a technical perspective. Important aspects to reflect upon were how the IT investment will affect the organization and how it affects the citizen. For instance: <i>"The internal discussion often concerns technology, technical platforms and systems, but questions should be raised such as what needs should be fulfilled, what we want to achieve in the public sector, and how we should proceed"</i> (OM A). Also, <i>"It is important to assess IT-projects initially if the IT-investment should benefit the organization and not only some individuals."</i> (OM B).
<b>Lack of co-ordination.</b>	It was criticized in the interviews that SFRA did not give guidelines regarding what applications to use. This has, according to several managers caused a costly ad-hoc development within the FRS/FRA. Furthermore lack of co-ordination on municipality level <i>should</i> also be criticized as it also had contributed to an ad.hoc development of IT. <i>"Unfortunately we give priority to individual desires instead of the total picture. We can't, for example, agree on one brand for digital cameras or digital calendars"</i> (ITM A).
<b>Few stakeholders involved.</b>	The managers looked for guidelines that could make explicit who should be involved when evaluating IT investments. Citizen perspective was considered as important. Furthermore, <i>"... not for catching the bad guys, just to be able to tie up, to draw a conclusion and to learn."</i> Another argument was to be better at prioritizing between different IT investments (OM C).
<b>Costs, narrow perspective.</b>	Only costs for hardware and software were calculated. A proper calculation was suggested to get better understanding of the total costs of used resources (ITM A, B and C). There is a tendency to buy new IT instead of upgrading (ITM B).
<b>No follow-up.</b>	No existing guideline for when to evaluate existed. A formal IT evaluation process was suggested: <i>"... not for catching the bad guys just to be able to tie up, to make a reflection and to learn."</i> (OM C). Another argument was to be able to catch up new ideas that pop up during the process (OM B).
<b>IT influence power relations</b>	IT is <i>"charged"</i> , i.e., IT gives people power (OM C). IT investments were often motivated by individual interests instead of the need of the organization.

**Table 6.** Issues identified in the interviews.

The interviews were then analyzed and summarized into the project plan that also presented how the research project was proposed how to proceed. The project plan included a description of the background, aim and goal of the research project, the findings of the phase representing. Furthermore was described how the project was supposed to proceed. Finally, it could be noted that when someone outside the organization participates in the interviews, the interpretations of the interviews are affected by the background of that person.

Reflections from this phase are that during the interviews the managers were considered collaborative, open-minded and indeed wanted to improve the evaluation of IT investments. Several managers at departmental and operative levels were also positive to tell their story to someone outside the organization. One advantage of individual interviews was that the managers were able to give rich explanations from their own perspective without any influence or interruptions by other managers. One operative manager also mentioned that the interviews triggered him to reflect upon how in fact the organization was doing evaluation of IT investments.

My role in this phase was to get contextual understanding of the organization such as how evaluation was conducted, the vocabulary that was used, perceived problems of IS evaluation, and how they perceive evaluating IT investments could be improved. This was accomplished by involving employees with different roles and from different levels of the organizations.

The next step in EaD was to find out and get inspired from other knowledge how the problems identified can be solved in order to improve IS evaluation.

## **5.2 Knowing**

In line with the EaD process it was time for the phase *Knowing* to find solutions to the identified problems in the prior phase. This could be accomplished by getting inspired by relevant IS evaluation literature and other activities. The purpose is to find knowledge that can inspire and gives support to thinking when developing new solutions for how to improve.

For instance to create a common “vocabulary” is of importance and was also identified during one of the meetings at organization A. The meeting aimed to discuss the need for investing in a new database that would secure the flow of information needed to the operative organization. A project manager gave a presentation on how information was stored today and what it might look like in the future. After the presentation the project manager expected comments and questions from the audience but none were raised. A few moments later one manager said that the reason that he did not ask any questions was that he considered the presentation too technical and did not understand much of it. Instantly two other managers agreed upon what the first manager had said. Thus, a vocabulary understandable for both IT managers and business managers is necessary in order to achieve meaningful discussions contributing to meaningful development and evaluation of IT investments.

The type of knowledge collected in this phase was from prior IS research and from a survey. However, inspirations could also be achieved from different types of consulting firms. Gartner Group has developed two well known methods supporting evaluating IT investments, Total Cost of Ownership (TCO) and The Total Value of Opportunity Approach (TVO). What is important is not to be governing by such methods and models but reconsider if they can support to improve IS evaluation from an organizational perspective.

Thus, this phase *Knowing* was collecting inspirations from a literature review and by a survey. The aim of the literature review in this specific case was to draw attention to factors and criteria supporting the content of IS evaluation. The factors and criteria identified are presented in Table 7. The survey, presented in the paper 3 investigated why managers do not to a larger extent evaluate IT investments and use a formal IS evaluation approach. The findings indicated that the attitudes of the managers towards formal methods, the common beliefs of the organization about formal methods, and the perceived ability to perform evaluation, affected how IT investments were evaluated. Furthermore, the attitude towards using a formal IS evaluation approach is mostly determined by perceived usefulness and not by ease of use. Awareness also has a significant effect on the formation of organizational norms about formal methods, and the coming workshops can support such awareness.

Factors	Criteria	
<b>Strategic match</b>	<ul style="list-style-type: none"> <li>▪ Business Strategy</li> <li>▪ Organizational strategy</li> </ul>	<ul style="list-style-type: none"> <li>▪ IS/IT strategy</li> <li>▪ Social goals</li> </ul>
<b>Impact on the organization</b>	<ul style="list-style-type: none"> <li>▪ Structure</li> <li>▪ Users</li> <li>▪ Business processes</li> <li>▪ IS/IT technology</li> </ul>	<ul style="list-style-type: none"> <li>▪ Culture</li> <li>▪ Power relations</li> <li>▪ Political systems</li> <li>▪ Attitude, ethical issue</li> </ul>
<b>Impact on the surroundings</b>	<ul style="list-style-type: none"> <li>▪ Customers</li> <li>▪ Suppliers</li> <li>▪ Collaborative organizations</li> <li>▪ Competitors</li> </ul>	<ul style="list-style-type: none"> <li>▪ Governmental agencies</li> <li>▪ Organizational flexibility</li> <li>▪ Integration process</li> </ul>
<b>Stakeholders' view</b>	<ul style="list-style-type: none"> <li>▪ Management</li> <li>▪ System users</li> <li>▪ Employees</li> </ul>	<ul style="list-style-type: none"> <li>▪ Suppliers</li> <li>▪ Evaluator</li> <li>▪ Customer</li> </ul>
<b>IT-specific perspective</b>	<ul style="list-style-type: none"> <li>▪ Accuracy</li> <li>▪ Quality</li> <li>▪ Usability</li> <li>▪ Speed cycle time</li> <li>▪ Flexibility</li> </ul>	<ul style="list-style-type: none"> <li>▪ Reliability</li> <li>▪ Interactivity</li> <li>▪ Synergism</li> <li>▪ Response time</li> </ul>
<b>Benefits and costs</b>	<ul style="list-style-type: none"> <li>▪ Tangible and Intangible</li> <li>▪ Direct and Indirect</li> </ul>	<ul style="list-style-type: none"> <li>▪ Dis-benefits</li> </ul>
<b>Risks</b>	<ul style="list-style-type: none"> <li>▪ IS/IT project risks</li> <li>▪ Software risks</li> <li>▪ Organizational disruption</li> </ul>	<ul style="list-style-type: none"> <li>▪ Uncertainty in surroundings</li> <li>▪ Value at risk-real options</li> </ul>
<b>Project organizing</b>	<ul style="list-style-type: none"> <li>▪ Project champion</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>

**Table 7.** Identified factors and criteria

Reflections from this phase *Knowing* are that the findings of the literature review gave inspirations to how to solve the problems identified in the phase, *Representing*. The survey informed how the attitudes of managers impact IS evaluation. Expanding one's knowledge on the basis of different sources can be particularly important when the topic is complex.

Therefore, my role as a designer in this phase *Knowing* was to collect knowledge from different IS literature. Central concepts related to what is to be evaluated when evaluating value from firm-level were identified. Thus the findings in this phase will support managers' thinking in the next phase, of what is to be evaluated such as central concepts in terms of factors and their related criteria. This will be described in the next phase *Designing*.

### 5.3 Designing

In this phase *Designing* the aim was to develop a Value Case and an evaluation process in order to improve the organizations capabilities to evaluate value of IT investments from a company level. This phase *Designing* was conducted in the same way in all three organizations, two workshops and a final presentation and discussion of the findings.

The first workshop started with describing the identified problems in the initial phase, *Representing*. Then the findings from the prior phase *Knowing* were presented. The managers in all three organizations seemed positive about the factors and criteria identified in prior research. Next, was discussed how then IS evaluation could be improved in the organizations. First the Value Case was discussed and many of the factors and criteria presented from the literature review were, in all three organizations, perceived by the managers important to involve. In particular the IT managers' perception of what should be reflected upon when evaluating IT investments seemed to agree upon the theoretical findings. The Value Case was then further discussed and extended with other criteria based on the managers' experience and contextual understanding. Then an evaluation process was developed for each organization and represented by a flowchart. The evaluation process was in all three organizations based on an iterative and formative process as presented in the interpretative IS evaluation approach.

The second workshop (second iteration) started by presenting the developed Value Case and the evaluation process from the first workshop. The managers then started to discuss how to improve the Value Case and the IT evaluation process. This time, the Value Case was expanded primarily by the addition of criteria related to the managers' contextual understanding such as goals from the business plan, demands from the union, and specific project organizing issues. In organization A and B, an IT council was appointed as responsible for the evaluation process. The IT council was proposed to involve managers representing the organization that is managers with different roles and from different levels. The IT council would then give recommendations to the management board and top manager about their perceptions about the initiated IT investments. The responsibility of the IT council would then be to ensure that the value of IT investment would be evaluated before the project, during the project and after the project. In organization C the managers (instead of an IT council) suggested a close collaboration between the IT manager and the departmental manager responsible for the operative work.

In the third meeting, the Value Case (content) and the IS evaluation process were presented to the managers in each organization. The Value Case and the evaluation process were perceived positively. The Value Case was pluralistic, formalized as a meta multi-criteria approach and includes both an economic and a stakeholder perspective. Concerning the stakeholder perspective, the Value Case includes the opinions of the stakeholders affected by the IT investment. The IT council should involve stakeholders represented by the organization and therefore managers from different departments and with different roles. The Table 8 presents the factors and criteria discussed when developing the Value Case.

The IS evaluation process was proposed to be improved, in organization A and B, by establishing an IT council responsible for analyzing and discussing the initial IT investment. The Value Case would support the IT council initial analysis as well as the follow-up of the IT investment along its life cycle. The IT council was justified as several of the members of the executive group were considered not to be interested in discussing IS investments, instead “*they prefer to sit at the grandstand and watch*” (IT manager at organization A). For this reason it was suggested that the IT council would involve managers from different departments and with different roles. The managers involved in the IT council would probably have an interest in and have experience of information systems and IT investments. The introduction of an IT council would, according to the managers, reduce the technical and individual focus and instead attention would be paid to the value of the organization, efficiency and effectiveness. However, the executive group would continue to discuss the approval of IS investments and then the Value Case would act as a base for the discussions. Furthermore, the top managers would continue to be responsible for the final decisions. Organization C, advocated instead of an IT council a strong partnership between the top manager and the IT manager. A data catalogue was suggested in which a template of the Value Case was available for persons initiating an IT investment. Then, the IT manager and the Departmental manager should discuss whether the IT investment should be approved or not. The “mini IT council” could be suitable for organization C as it is less comprehensive than organizations A and B.

Reflections from this phase, *Designing*, are that the findings from the phase *Knowing* and the managers’ contextual and practical knowledge added valuable input to the workshops in the phase *Designing*. During the discussions the managers easily agreed upon what to include in the Value Case and how the evaluation process should be performed. The theoretical input gave increased understanding and learning how to improve IS evaluation. The theoretical input therefore made the designing of a Value Case and an evaluation process easier since the managers got an overview and increased understanding of how to evaluate IT investments. In addition, the theoretical input supported the creation of a common vocabulary included in the Value Case.

My role as a designer in this phase was to act as a project leader and support the meetings and the discussions with knowledge from prior research. According to the managers bridges were built between practice and theory, and between different departments and different roles.

Effectiveness	Organization A	Organization B	Organization C
<b>Strategies and goals:</b>	Of the organization, IS, IT, BSC, Safety and Health Activities.	Of the organization, IS and IT.	Of the organization, IS and IT.
<b>Impact on the surroundings:</b>	Politics, Economy, Society, Technology, Citizens, Collaborative org. Dependencies to regulations or other projects.	Collaborative organizations or other actors.	Other Actors.
<b>Efficiency</b>			
<b>Impact on the organizations:</b>	Structure, Processes, Information Technology and System (IT/IS) Employees', Power and Culture.	Structure, Processes, IT/IS, Employees, Power and Culture.	Other dep. IT/IS, Processes
<b>Benefits, economic and qualitative:</b>	Citizens, Employees, Economy, Development, Infrastructure, External actors. Who is responsible for the benefits?	Municipalities, Citizens, Org., Dep. and others? Periodize the benefits. Responsible for benefits?	Users, The organization, Third man, External actor.
<b>Costs:</b>	Project, Purchase, Implementing, Education, Required changes, Running costs, Licenses and Negative effects.		
<b>Risks:</b>	The decision process is deep enough. Key persons in the project? Software, Supplier, Security, Costs or other risk. Too much technique focus? New directive? New policy from the municipality?	Dependency on other projects, financiers, and suppliers. Technology. Operating the project. Environmental factors. Competence.	No risks were put forward by the organization.
<b>IT investment:</b>	What happens if we introduce this system and it stops? Are there any similar projects going on? Functional demands. Information security? Integration to existing IT? Changeable? Demands from the operation running the system? Support? Other questions?		Security, Back-up and Demands for upgrading.
<b>Stakeholders affected by IT:</b>	Opinions. Pre-knowledge? Affect the use of resources?	Opinions. Pre-knowledge?	Opinions.
<b>Project organization:</b>	Describe the operating and the administration of the project.	Describe the operating of the project and resources needed?	Timetable and responsibilities.

**Table 8.** Factors and criteria influenced the Value Case.

## 5.4 Applying

The aim of this phase, *Applying*, was to apply and adopt the developed Value Case and the evaluation process into the organizations. In organization A, the Value Case was tested in two IT projects, the update of the Enterprise System Ikaros 4 and on a new communication system Rakel. Then, the IT department started to use the Value Case as a formal document for all IT investment that the IT department was responsible for. For IT projects that the business managers were responsible for the business managers used the Value case as a supporting tool for their own thinking when evaluating IT investments. One explanation given by the IT managers as to why the business managers did not consider the Value Case as important as the IT manager was that the whole organization was influenced by the 90 second turnouts, act first and think later. The IT manager, considered the Value Case useful to the organization as:

- The Value Case acted as a guiding tool and a template for the discussions between IT department and the business departments. For instance, if the business managers want support from the IT department for a new IT investment it is now easier for us to explain to the business manager that the business department needs to pay for the education of employees at the IT department.
- The business managers and IT managers have also started to communicate and interact more effectively as they both had increased understanding of different factors and criteria that needed to be reflected upon when evaluating IT investments.
- Furthermore, the Value Case has supported to the building of a common vocabulary of IS evaluation and that has enabled the managers to better understand the concepts related to IS evaluation in a similar way.

In organization B, the Value Case and the evaluation process were discussed with the IT manager and the strategic manager. The strategic manager, who had not previously taken part of the interviews and workshops, appreciated the Value Case and the evaluation process as it involved important aspects that needed to be reflected upon when evaluating IT investments. Unfortunately, the organization was then affected by large cost savings and the top manager had to leave his position. Shortly after the cost savings, managers related to the municipality decided that the FRS should start to collaborate with other FRS and become an FRA. However, the Value Case continued to be a supportive tool for the IT manager, but the designed evaluation process did not have any impact on the organization.

In organization C, the Value Case and the evaluation process were after the phase of *Designing* put into use after the phase *Designing* was finished. The Value Case and the evaluation process were considered to be well documented and easily applied.



In organizations D and E the Value Case was presented to the top manager and to the analytic chief manager. Both managers had the opinion that the Value Case was a good support for evaluating IT investments as the Value Case includes aspects that they had not previously thought about, but that they now understood were of importance for evaluating organizational value. When they took part of the Value Case they also mentioned that the factors and criteria presented in the Value Case were also well suited to use when evaluating investments in general.

Reflections from this phase were that it was interesting to notice that it was the IT managers in all three organizations that seemed most motivated to improve the organizations capability to improve IS evaluation. One reason for this can be that the IT department gets affected by bad decision-making of IT investments. For example, in one of the organizations the IT manager explicitly mentioned that the *ad hoc* development of IT within the organization put a lot of pressure on the IT department and therefore they wanted to change and improve how IT investments were evaluated. The Value Case was perceived by the managers to improve IS evaluation by focusing on organizational value, instead of, as previously, on individual and technical matters. In organization A, the top manager had not the same motivation to change the procedure of evaluating IT investments. Furthermore, several of the business managers in the organizations had a high level of technical interest that might have affected the interest of knowing the outcome of an IS evaluation. This is problematic as the budget process in the public sector often focuses on costs and not the benefits. Consequently, managers at the public sector can spend money on what they find interesting as no connection between cost and organizational value in terms of effectiveness and the citizen perspective is ever made. Another reflection is that to improve IS evaluation within public organizations is a political exercise and is dependent on top managers' motivations and/or directives from people higher up in the political hierarchy.

The findings mentioned above indicated that power and political factors play a significant role in forming the managers' intention to conduct formal IT investment evaluation. Findings of the paper 5 supported the findings in the FRS/FRA that the use of formal IT evaluation methods is strongly influenced by the supervisors' use of formal evaluation methods. In addition, the findings of the paper 5 suggested that influence from managers can directly motivate subordinates to actually use such methods. While perceived usefulness still significantly influences the intention to evaluate IT investments the power and political factors are shown to influence the action directly. Organizational power and politics therefore affect the evaluation process of IS investments. The results of the survey (paper 5) indicate that if the managerial stakeholders or individuals in power resist change towards more formal methods, then it is unlikely that any evaluations will be conducted. In addition, the results suggest that influence from supervisors can directly motivate subordinates to actually use these methods.

The findings from the survey also indicate simultaneously some prerequisites for managerial adoption of an interpretive IT evaluation approach (stakeholder perspective). First, a culture of interpretive evaluation most likely needs to be shared by the top management. Secondly, awareness of political benefits, which can be gained from active evaluation, seems, indeed, to enhance the intent to evaluate among the respondent managerial stakeholders of the inquiry. In summary, the result suggested that the advocates of the interpretivist approaches need to adopt a political agenda in favor of demonstrating the political benefits of evaluation in itself for the top management.

Given the results, managers must acknowledge the political nature of IS evaluation and use the power and political channels to effect and justify the use of formal evaluation methods. Sometimes IS evaluation can be a political tool to gain more power in organizations rather than just to be able to make better IT investments. The results suggest that managers should be able to analyze the political consequences and power shifts that are caused by the adoption and implementation of formal IT evaluation methods. If the managerial stakeholders or individuals in power resist change towards more formal methods, then it is unlikely that any IS evaluations will be conducted.

My role as a designer varied in the organizations. It was dependent on what was to be accomplished. For instance, in organization A the role was to take an active part when doing a pilot study on two IT projects. In organization B the role was more passive due to the fact the organization was restructured. In organization C the role was passive as the implementation did not need further attention of the designer.

## **5.5 Evaluating**

In this phase, *Evaluating*, the managers involved in the research project evaluated both the EaD process and the outcome of EaD in order to make explicit what had been learned. The aim was to create an increased understanding of how EaD had affected managers' understanding of IS evaluation and the managers' perception of EaD and its outcome.

In organization A, two managers were interviewed, in organization B the IT manager was interviewed, and in organization C, the IT manager and the operative manager were interviewed. Due to the fact that a long time had passed since the IS project was initiated, not all managers, for different reasons, were available for interviews.

In organization A, the project manager thought that the research project and the Value Case had improved the understanding of IS evaluation. Learning about IS evaluation was considered a necessity in order to improve evaluating IT investments. The manager said that the EaD had created:

*“An increased understanding of the fact that different stakeholders affected by the IT investment should be involved in the evaluation process; for example employees from*

*the IT department who are responsible for running the IS and those who are responsible for the money.”*

*“Open up the climate for managers, with different roles and from different levels, when discussing IT investments.”*

*“Increased understanding that value of IT investments involves different stakeholders’ perspectives.”*

*“Increased understanding for that we must pay more attention to effects of the IT investments after implementation and reflect upon costs such as licenses and future development costs.”*

*“Increased awareness of the fact that the project leader needs the Value Case in the preparatory work in order to be able to evaluate IT investments at an organizational level”*

The manager perceived that the evaluation of IT investments had taken several steps forward but that it could still be improved. The manager said that investing in IS can be compared to investing in a new house. In discussions with the supplier you choose the color but you have no competence in evaluating the building as a whole. In that specific situation you should have a person who can advise you on what should be included in the contract and to follow up the construction of the building. The manager suggested that such competence should be available to the public organizations when investing in IS and in particular when making large IT investments. Other aspects the manager mentioned that affected IS evaluation include the culture of the organization and how top managers govern the organization. It would look quite different if the IT manager was responsible for the organization, and then IT investments probably would have been evaluated more strictly.

In organization A, the IT manager said that the EaD and the Value Case was positive in several ways:

*“It makes clear that IS evaluation needs a formal process”.*

*“The Value Case acts as a filter to new initiatives in the organization. Several times after an initiator of a new IT investment had taken part of the Value Case the initiator had become aware of the fact that the IT investment was not well suited for the organization.”*

*“The new IT manager always uses the Value Case in his communication with the business since it facilitates the dialogue. For instance, when the IS department takes responsibility for a new application it becomes easier to negotiate with managers since they can refer to the Value Case.”*

*“It really improved the cost calculations for the IT investments.”*

This IT manager considered the Value Case and evaluation process useful, but meant it was difficult to make business managers use it. In his view, it should be mandatory since the organization is characterized by the 90-second perspective. The manager was frustrated by the fact that having worked for 25 years in the public sector and despite all that is known, investing in IS without showing the benefits of the investment is still possible. Another factor affecting the use of EaD and the Value Case is the low maturity level of IS in the organization. The IT manager explained low maturity as the organization still meets their basic needs when it comes to investing in IT. New competence was needed but,

*“What frightens me is that when we employ a person with a new competence we do not use the person properly. Instead the managers, educated for managing fire rescue service and lacking competence in running IT projects, continue to run the IT projects since they are interested in running IT projects and in the technique. Then, the person with new competence is running projects that concern the fire rescue services?”*

Furthermore the costs of IS was described as increasing rapidly in the organization. For instance, a new communication radio (digital) will increase the cost of communications by a factor of five and the organization will probably continue to have the old system (analogue) as well. According to the ITM it is alarming that no one in the organization has the total picture of the costs of IS as the costs have been split into different departments.

In spring 2010 the IT manager in organization B was interviewed. The manager considered the organization to have low level of IS maturity as the organization still is trying to meet the basic needs of the organization. One comment on the EaD process was:

*“Instructive to realize that it is easier said than done doing evaluation of IT investments. The discussions in the workshops were of value as it did not only focus on costs but also on value and benefits, and why evaluate IT investments. It was also of great value to take part of the summary of factors and criteria that can support evaluating IT investments.”*

The Value Case is still working as a supportive tool for the manager when evaluating IT investments. However, practical considerations in the organization have restricted the organization to continue implementing the evaluation process.

In organization C, the operative manager remembered the research project vaguely but the process has not affected his work since he is not evaluating IT investments. However, he has experienced that the new organization does not try to learn from mistakes. Instead when a mistake occurs, the focus is on whose fault it is rather than the reasons behind it and how the organization can change in order to reduce the risk that such things continue to happen.

In organization C, the IT manager described the EaD process as well done and believed that it could not have been accomplished in any other way. EaD was an eye-opener and led to new ideas about how to think. The manager also emphasized that it was good that someone from

outside the organization came and presented how IT evaluation could be improved and how we could work with IS evaluation. Several of the improvements discussed were in correspondence to what the IT manager thought. The IT manager also perceived that the presentation from prior research created a bridge between the academy and practice. EaD had changed his behavior in the following way,

*“I think differently now and I have got new references. Earlier I perceived that the value of an IT investment was based on the price of the hardware and software compared to what the system could accomplish. Then I bought the new application and implemented it. Today I pay more attention to what the IS can contribute to the internal users and to the citizens. I focus more on what the people using the system will need and what the IT investment would bring about. Earlier it was important that the application could do a lot of things but now I look more at the information in a matter-of- fact manner. You could say that the focus has moved from all funny things the application could accomplish to the need of users and on the purpose the IT investment will have in the organization and then we look for an application that will meet such demands.”*

However, the IT manager mentioned that one of the managers thought the presentation from prior research was too academic so it depends on the references you have. He thought people involved in such a process would benefit if they had practical experience of evaluating IS investments.

Reflections from this phase are that the managers’ interviewed were positive about EaD for several reasons such as it created a bridge between the academy and practice. Furthermore, the EaD change the attitudes of the managers involved in the EaD process. For instance several of both business and IT managers took a step from mainly a technical and cost measurement focus including the cost of hardware and software to a multi-criteria approach including the perspectives of efficiency and effectiveness. The Value Case was considered to be a useful document for the managers when evaluating IT investments as it created an increased understanding of what should be reflected upon when evaluating IS investments. The carrying through of EaD has also, according to the managers, opened up discussions between managers from different levels and with different roles. Furthermore the managers have realized that value of IS must be reflected upon from a pluralistic perspective. Several managers also mentioned that the Value Case was suitable as a support of thinking for other investments. The evaluation process has also improved as the managers in business and the managers in IT department to a larger extent did collaborate and discuss the initiated IT investments. The IT department was now in larger extent included in the discussions of the value of IT investments.

Therefore, from this phase *Evaluating* it is understood that both managers’ understanding of IS evaluation and the IS evaluation were changed and improved. For example:

- In organization A:
  - There were better cost calculations.

- The analysis of IT investments has improved by using a meta multi criteria approach.
- There was better collaboration between the IT department and Business.
- The behavior changed by discussing to a greater extent with other stakeholders.
- In organization B:
  - Put attention on value and benefits.
  - There were better cost calculations.
  - The analysis of IT investments was improved by using a meta multi criteria approach.

Organization C does not exist anymore but according to the IT manager interviewed, the EaD changed his behavior when purchasing IT applications. Today he involves the stakeholders affected by the IT investment. Before EaD he focused more on the IT application and what it could accomplish instead of focusing on the need of the organization. Thus, he changed attitude.

Improvements when evaluating IT investments were also made.

- From an economic perspective:
  - The evaluation changed from including measure costs to a meta multi-criteria approach.
- From a stakeholder perspective:
  - The concept value changed “*from the eye of the beholder*” to a pluralistic and organizational view.
  - Evaluation was seen as formative. Previously the evaluation was summative.
  - Both stakeholders from the organization and stakeholder affected by the IT investment are involved.
- The design process:
  - Gave managers increased knowledge of IS evaluation.
  - Improved the collaboration between business and IT managers.
  - Provided managers with a better analysis of the impact of IT investments on the organization.

Some reflections from applying EaD in three public organizations are that the design process of EaD can still improve. Initially in the design process the maturity level of the organizations should have been reflected upon. During the process it must be ensured that the managers involved understand the vocabulary used.

My role as a designer in this phase was to interview the managers involved and enable the designer to learn from the past for the future.

## 6. Discussion

This chapter includes the discussion of how and why EaD can help managers to improve IT investments. Then the contributions to IS research and practice are presented. Finally the limitations of this research project are discussed.

### 6.1 Balancing IS Evaluation

The two mostly discussed IS evaluation approaches in IS literature are the economic and financial methods with a measurement focus and interpretative IS evaluation approaches with a stakeholder perspective. The economic perspective includes different evaluation types such as measures, objectives and multi-criteria approaches (Guba and Lincoln 1999). Bannister (1999) took the evaluation types one step further by also including meta approaches. What should be evaluated can be related to efficiency (how the resources are used) and effectiveness (fulfilling the goals of the organization), and is the task of managers' (Lewis et al. 2007). Therefore, the economic perspective can be related to a decision attitude. The use of an economic perspective when evaluating IS has been claimed to be a too narrow view of IS value since such an evaluation needs an approach with a pluralistic view and contextual understanding. Therefore, Interpretative IS evaluation approaches with a stakeholder perspective, such as the CCP framework have been put forward (Symons 1991; Jones and Hughes 2001; Stockdale and Standing 2006). These approaches are based on the premises of a pluralistic value perspective, the importance of contextual understanding and the view of evaluation as a formative process. However if the stakeholders lack necessary knowledge and experience of how to evaluate IT investments then the outcome of IT investments is still likely to go wrong. In IS literature there has been few discussions about how one may cross-fertilize the two approaches from a company level. However, this is what Boland and Collopy (2004) do when they discuss how to balance a decision and design attitude.

Boland and Collopy (2004) claim that managers should act as designers and not only as decision-makers making rational choices. Boland (2008) describes the design attitude of Boland and Collopy even more explicitly by combining the concepts "sense-making" and "decision making". Boland (2008) notes that "*Design thinking enables us to bring the tradition of both sense-making and decision making into a single overarching framework of action, which then allows us to draw upon and benefit from their complementary strengths*" (Boland 2008, p.62).

The aim of this thesis is to develop the idea of EaD and create understanding of how it can improve managers' understanding and evaluation of IT investments. The research question that this study address is: *How and why can EaD help managers to improve evaluation of IT investments?*

The findings of this research project indicate that EaD can improve an organization's ability to understand and improve the evaluation of IT investments. The essence of this approach is the design process involving different phases and these phases will be further discussed as follows.

The initial phase of *Representing* gives managers an opportunity to discuss and reflect upon perceived problems related to evaluating the value of IT investments. Interestingly, the problems identified were not confined to questions surrounding IS evaluation, but also reflected other management challenges such as implementing a strategy. Consequently, the outcome of this phase gave managers an increased awareness of a range of different problems related to IS evaluation and in particular the problems arising in the IS evaluation because of absence of a coherent business strategy. The interviews and discussions in this phase generated understanding and awareness of how evaluation is conducted, identified problems and suggestions on how to improve. This is of importance for the design process as the aim of that process is to create understanding of the context of IS evaluation.

The second phase, *Knowing*, created an increased knowledge of the problems and issues raised in the first phase. A literature review was undertaken to identify previous and current literature that has addressed these problems and issues. The objective was to find solutions from the literature that could be applied to the problems addressed in the organizations. It was important that the literature review was not based on the designer's perspective, but on that of the managers who are familiar with the organization, its needs, operations and strategy. Managers were also surveyed in order to understand their attitudes to IS evaluation. This information would be of value when presenting the findings from the literature and the findings from the literature to the managers. It was also essential that the managers could relate the theoretical findings to their problems.

The third phase, *Designing*, included an iterative process that focused on designing a Value Case (multi-criteria model) and an IS evaluation process. This phase started with discussing and creating understanding of issues identified in the first phase of *Representing*. Then the findings from the literature review identified in the preceding phase of *Knowing* were introduced. The findings included inspirations from different methods, objectives and factors and criteria put forward by prior IS evaluation research, which can be related to the economic perspective. Followed by inspirations from the interpretative perspective, how IS evaluation can be performed. After this the workshops opened up for discussions among managers from different levels and with different roles. The discussions were perceived by all managers to be positive for several reasons. It gave the managers an increased understanding of the role and responsibilities of managers from other departments. It also helped the managers to focus on what is important to take into account, from an organizational view, and what to reflect upon when evaluating IT investments. Most interestingly of all, managers said that the phase of *Designing* opened their eyes to new ways of thinking about IS evaluation.



The fourth phase, *Applying*, focused on getting the Value Case and the evaluation process applied in practice and, if necessary, adapted to the specific context. The organizations here varied in the ways in which they proceeded during the phase. One organization tested the outcome before adopting the Value Case. In another organization the Value Case was used as a supportive tool by the business managers and as a formalized document by the IT manager. In the third organization the Value Case and the evaluation process was implemented immediately after the *Designing* phase. This phase *Applying* is of importance as it makes each manager better understands how to improve and make changes. It is of major importance that managers reflect on this and not just go directly to implementation. For instance, one top manager said “I am not sure I want to know the outcome of IS evaluation”. With support from the findings from the survey it is obvious that power and politics remain an important issue that needs attention in the organizations.

Finally, the phase of *Evaluating* gave the managers the possibility to reflect upon EaD as well the outcome of EaD, the designed Value Case and the evaluation process. The findings of the interviews indicated that EaD had enhanced the managers’ understanding of IS evaluation and also influenced the way in which they evaluated IT investments. For instance, the managers have increased their understanding of the *economic perspective* as a shift did occur from focusing on technical issues and calculating cost for hardware and software to the use and support of a meta multi-criteria approach, the Value Case. The Value Case functioned as support to thinking in all three organizations. The evaluation process was, for different reasons, implemented in one organization. The cost calculation of IT investments in the Value Case had also improved as the calculations were more comprehensive. From a *stakeholder perspective* several managers did change their behavior to be more collaborative. For instance the collaboration between IT managers and business managers in one of the organization was considered as having improved. Another IT manager admitted that he had changed his behavior from focusing on the capability of the artifact to the need of the organization. Therefore, the EaD approach seemed to have positive effects on both the decision attitude and on the design attitude. It is also obvious from this research project that managers’ understanding of IS evaluation and how IS evaluation is conducted had changed. A final reflection is that this phase, *Evaluating* was conducted by interviews but could have been accomplished by workshops discussing the EaD and its outcome from different perspectives.

The first outcome of EaD, the Value Case, was perceived by the managers involved as supporting thinking regarding what needs to be reflected upon when evaluating value of IT investments. The Value Case involved different evaluation aspects represented by different factors and criteria. Most of the factors and criteria represented were presented in IS literature but some were also suggested by the stakeholders involved. This implies that the decision attitude and the economic perspective have improved.

The second outcome of EaD, the IS evaluation process, designed by the managers, involves stakeholders from different levels and with different roles. The IS evaluation process was influenced by the interpretative IS evaluation approach (Jones and Hughes 2001; Stockdale

and Standing 2006), and designed as a formative process. A formative IS evaluation process was motivated by the managers for several reasons such as the following:

- Implementations of IT investments were sometimes a technical success but then the IT investment was hardly or ever used. That had negative economic effects on the organizations as they paid for expensive licenses but did not receive any value to the organization.
- The learning process of the IT investment for the users started only when the IT investment was technically implemented and the users could start using the information system. Therefore, in order to be able to manage the expected as well as new identified benefits, a formative process is needed.
- If the implementation of the IT investment fails, one should learn from that fail instead of trying to find a scapegoat.
- The IT development could better be coordinated within the organizations and reduce the ad-hoc development of IT.

## **6.2 Contributions**

The contribution of this thesis is the development of EaD as an approach that seeks to improve organizations' capability to evaluate the value of IT investments. EaD supports managers in taking a design attitude that balances an economic and stakeholder perspective on a meta level.

### **Contributions to IS Research**

This thesis contributes to IS evaluation literature by demonstrating that EaD as a meta level approach can help managers to balance decision-making and sense-making when evaluating IT investments. Recognizing the centrality of a design attitude, this approach can be characterized as:

- Representing IS value by balancing decision-making and sense-making as complementary perspectives.
- Organizing IS evaluation as a collective effort including stakeholders at multiple levels and at firm level involving the stakeholders of the IS.
- Characterizing IS design as a meta-level activity improving socio-technical systems.

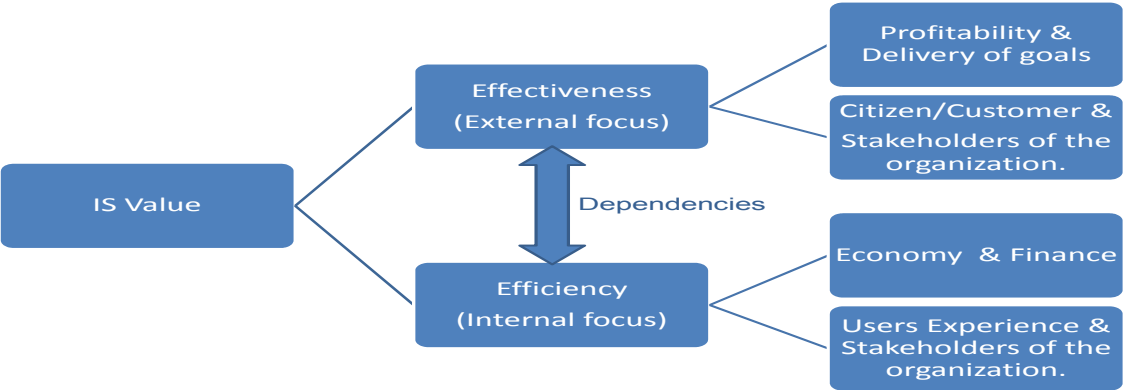
### *IS Value*

IS Value is a complex notion that involves both the consideration of an economic (decision attitude) and stakeholder perspective as IS is a socio-technical system. In the management literature the tasks of management have been described as the process of administrating and coordinating resources efficiently and effectively (Lewis et al. 2007). Efficiency is presented

as using the smallest amount of input to generate a given output and that is *doing things right*. Effectiveness is, according to the same authors, the degree to which goals are achieved and *doing the right things*. The value of IT investments from a decision attitude can therefore be represented by an efficiency and effectiveness perspective. Guba and Lincoln’s (1999) have presented the first, second and third generations of value as represented by measures, goals and judgments. These generations are described by Guba and Lincoln as Managerialism, i.e the choice is entirely in the hand of the managers and can therefore be related to a decision attitude. Then how efficiency and effectiveness can be evaluated can be related to the first three generations as described by Guba and Lincoln (1999)

Guba and Lincoln (1999) claim that the first three generations of evaluation is too limited and therefore they presented a fourth generation of value. The fourth generation claims that value is represented by the perceptions of the stakeholders involved . The interpretative IS evaluation approaches also consider value as represented by the perceptions of the stakeholders involved (Jones and Hughes 2001; Stockdale and Standing 2006). Guba and Lincoln (1999) do not think the first three generations of evaluation should be completely abandoned rather they are complementary to the fourth generation of evaluation. This makes sense since only relying on stakeholders’ perceptions can be challenging if the managers lack understanding of how to deal with the complexity of IT evaluation.

Boland and Collopy (2004) have put forward a design attitude including a design process that is knowledge based and includes established knowledge and know-how of the stakeholders involved. The theory of “Managing as Designing” is inspired by Herbert Simon who has placed attention on striving for a kind of design that has no final goals and makes our design “humanly satisfying” as well as economically viable” (in Boland and Collopy 2004). Therefore taking a balanced view of IS value means seeing both efficiency and effectiveness from a decision-making perspective, see Figure 5. The efficiency and effectiveness perspective are represented by both an economic and a stakeholder perspective.



**Figure 5.** Value as represented in the EaD approach.

The value of IT from a firm-level perspective is of importance for managers to understand; otherwise wrong decisions can be made that can have a negative impact on the economy and cash flows of the organization. Thus, how the value of IT investments is understood and evaluated has implications for the success in evaluating and achieving value of IT investments.

However, the question is if an economic and rational focus and a stakeholders' perspective are sufficient? According to Boland et al. (2008) functionality is never fully realized and should always be open to including new realms of human experience. The authors note that functionality starts with efficiency and effectiveness but the circle should be enlarged by including, for example, customer experience, ethical behavior, environment, cultural norms and aesthetic appeal. In this case the organizations were far from achieving efficiency and effectiveness. In future research it would be of importance to enhance increased understanding of the different components of the concept value presented by Boland et al. (2008) in order to improve IT evaluation.

Even if value is clearly defined it can be obstructed by power and politics, which is still a main issue in IS evaluation as presented in paper 5. Another issue that needs further attention in the future is therefore "turf wars", which put personal and group interests before what is best for the organization. Bannister (2005) draws attention to the problems of power and territorial games in the implementation of e-government. The problem became evident in one of the FRA's which was, according to the IT manager, affected by the culture of the "emergency", i.e. to act first and think later. Emergency services by nature have to frequently make rapid decisions based on an intuitive understanding of the situation with which they are faced. Such understanding is built up from experience; the decision-maker rapidly relates the decision he must make (and quickly) to comparable previous experiences and events. In such a culture, adjusting to slower carefully thought out decision-making might be challenging. As noted above, one IT manager mentioned that during his twenty-five years in the public sector he had never experienced a situation where a business manager needed to demonstrate the value of their IT investments. This is rather alarming.

In future research it would therefore be of interest to further explore the role of turf wars and how to minimize the impact of self-interest and self-serving actions that do not create IS value from a company level perspective. A designed, formalized Value Case part of the evaluation process can perhaps be the first step. In the research it was found that several managers perceived that the Value Case acted as a filter for different IT investments initiatives. When the initiator filled in the Value Case and the different factors and criteria included in the Value Case were reflected upon, the initiator often realized that the IS initiative was not a particularly good idea. In future research it would be of interest to further investigate how and if a formalized, pluralistic IS evaluation approach based on EaD can reduce the impact of power, politics and turf wars.

A key advantage of EaD as an evaluation approach is that stakeholders of the organization can get involved in the design process. When this happens it is more likely that there will be support for the outcome and that the outcome will be seen to have legitimacy. However, this study has shown that, as in other business initiatives, the top managers need to support the idea.

### *Evaluation*

Evaluation of organizational value of IT investments is a complex field of study with a wide ranging scope (Berghout and Remenyi, 2005). Different types of IS evaluation have different focus as they present IS evaluation from different levels, focusing on different IT artifacts, evaluating from different perspectives, differ in time when evaluation should take place and value is represented differently. The last ten years of IS evaluation research has not resulted in much progress in resolving this disappointing situation (ibid).

For the interpretative IS evaluation, stakeholders appear to be an essential part of the evaluation. But, there seems to be a lack of explanation of how they should be identified and included in the evaluation process. The content of IS evaluation is raised by the involved stakeholders' issues, claims and concerns that should be solved in consensus. Therefore who should be involved in IS evaluation is rather important to understand. Is it the stakeholders of the IT investment who should be identified or is it the stakeholders of the organization, or both? Not paying attention to the stakeholders of the organization but to the stakeholders of the IS can give too much internal focus on users, and customers of the organization or citizens (if a public sector) get limited attention. Also, if the IT system is new and users and the stakeholders are without any experience and pre-understanding of the IT system, is the interpretative IT evaluation approach sufficient? Furthermore, consensus is hardly a way that will work in practice as someone needs to take the responsibility. Therefore the design attitude, as suggested by Boland and Collopy (2004) can be a way to combine a stakeholder perspective with a decision attitude in order to better understand how to solve the problem and decide how to proceed.

When it comes to content it is not evident what to evaluate and is, of course dependent on the context. However, several researchers assert that the research field is still far from generally accepted motions (Berghout and Remenyi, 2005; Irani and Love, 2001). Thus, attention needs to be focused on creating an understanding of important concepts as to avoid substantial misunderstanding and disagreement (Berghout and Remenyi, 2005). Given this need for common understanding, this thesis gives an overview of different evaluation factors put forward in previous research, see Table 6. In practical terms, this overview contributes to an increased understanding of different factors and criteria important to consider when evaluating IT investments.

IT investments are also dependent on the context they occur in, therefore it is important for the research field of IS evaluation to give guidelines on how an organization could develop its own IT investment evaluation model.

EaD involves a design process at meta level supporting managers to take a design attitude. This design attitude balances an economic and stakeholder perspective when improving the IS evaluation of IT investments for a specific context. For instance, the managers involved in the study were positive to the discussions in the workshops, which, according to the managers have several positive outcomes. A couple of examples are enhanced understanding of other managers' view of value, and what needs to be reflected upon. A common vocabulary was also created by the theoretical framework, which facilitated the future discussions about what needs to be reflected upon in order to understand value from a company. That a stakeholder involvement was perceived as positive was also indicated in the findings as in organizations A and B the managers chose to organize an IT council in which stakeholders represented from different levels and roles were to be part of. Of course the stakeholders of IT investment are still important but are probably better suited as evaluators when evaluating IT investments at firm level. Therefore, in future research it would be interesting to further discuss who in fact should be part of IS evaluation, and, also to discuss, on a meta level, how evaluating IT investments should be performed at a specific context and how to organize it?

### *Design*

Design is fundamental to IS research as IS professionals are engaged in IT that could improve the performance of the organizations. According to March and Storey (2008), business managers often look at the performance of IT through the economic lens and strive for achieving balance in the budget or for profitability. These managers will, according to the authors, ask questions such as “Why do investments in IT artifacts often not result in an increase in firm value?” and “What IT artifact will do so?”. The first question is described by the authors as a theory-based, causal-related question. The second question is described as a design-based, problem-solving question. Both are critical in the IS discipline. To be able to answer the first question, the authors proposed the need for understanding the intersection of organizations, people and information technologies. Answering the second question concerns problem-solving and is a design task that requires researchers to focus on IT artifacts that extend the boundaries of known applications of IT. Answering the second question is also described as the task of design science (DS). The question is if answering only the second question is enough to design useful IT artifacts that gives value to the organization. Is it not also required to have an understanding of the intersection of organizations, people and information technologies? For instance, Boland (2008) suggests decision-making and sense-making as complementary on a meta level in order to enrich design and improve decision-making. This metaphor could perhaps also be used in IS research as a way to improve the relevance of IS research, that is not only understanding the IT artifact but also the social settings in which it should act.

Hevner et al. (2004) discussed design research (DR) as focusing on the construction and the type of evaluation of the artifact that meets organizational needs. The main concern of DR is the artifact and the use of the artifact (ibid). The research method of Action Research is described as focusing on change and improvements of social setting (Mathiassen 2002). The

main focus is on organizing AR in the social settings and making changes. However, DR and AR have some similarities such as dual contribution to practice and academy, and acting proactive and to intervening (Hevner et al. 2004). According to Hevner et al. (2004) AR and DR have a common epistemology, ontology, and axiology (values) and can therefore inform each other. This research project used CPR to organize and give structure to organizational settings but not as much information about how to develop the IT artifact can be extracted from this method. On the basis of this research project it seems that AR and DR can be complementary when it comes to design of IT in complex social settings.

Hevner and Chatterjee (2010) have also presented a solution for how to combine AR and DR. The “synthesized” research approach includes four stages. Hevner (2010) writes that such a research approach would enable more relevant IS research. Sein et al. (2011) have also presented an Action Design Research method and researchers criticize the DR method for being too technical and paying too little attention to the organizational context. Therefore, their approach has interwoven the activities of building the IT artifact, intervening in the organization, and evaluating it concurrently. In future research it would be interesting to use ADR as ADR offers both the focus on the organization and its environment and the focus on the artifact. ADR can be one step in the right direction in order to improve the relevance of IS research in practice. ADR can therefore be a step towards what Van de Ven (2007) puts forward, design *with* instead of research *for* practice?

### **Contributions to management**

EaD makes it possible for business managers and IT managers to adopt a design attitude when solving the issue of how to evaluate value of IT investments. A design attitude is suggested that can improve over time the organization’s capability to evaluate value of IT investments. A design attitude can be accomplished by implementing a design process that balances a decision attitude and a stakeholder perspective. Furthermore the contributions to managers can be described as enhanced understanding of:

- The decision attitude by providing a framework describing different evaluation types and also what factors and criteria that can support a decision attitude.
- The stakeholder perspective and how to integrate a stakeholder perspective with a decision attitude.
- The design process and how to integrate the understanding of stakeholders of the organization with established knowledge.

The decision attitude, the stakeholder perspective and the design process will be further discussed in the following.

#### *The Decision attitude*

The decision attitude of the managers changed during the research project. From the beginning the managers used an evaluation types such as measure and ended up with a meta multi-criteria type, the Value Case. EaD can support managers that instead of being governed

by prescriptive management fads to take a design attitude and ask what the organization wants to accomplish, and as in this case, how evaluating the value of IT investments could be accomplished in the organization in order to better understand the value of IT investments. Weil and Ross claim that managers disregard their responsibility to evaluate IT investments and that a formalized approach is crucial in order to achieve value of IT. That formalized approach should be developed from the need of the organization and not by a predesigned IS evaluation approach. Xue et al. (2008) also claim that it is important to make evident who influences the decisions of IS. This can also be accomplished by the EaD as when developing the evaluation process it should be evident who should be involved.

The findings of this study indicated that many, though not all, managers wanted to take their responsibilities seriously and evaluate value of IT investments by using the Value Case and improve the IS evaluation process. The Value Case involving different factors (see Table 8), supported managers' understanding of what needed to be reflected upon and enhanced understanding of problem-solving. Interestingly the IT managers were more interested in moving forward and meeting changes in the evaluation process than several of the business managers. The reason why business managers were not as motivated can be attributed to several possible factors such as practical pressure, power and politics, culture, and turf wars. However, in the workshop groups in the design phase in each organization, it was evident that there was no disagreement as to the need of a formalized, pluralistic and formative IT evaluation process.

In the public sector it will be even more important to reflect upon strategies and goals as many of the organizations are driven by political goals. If strategy and the goals of the organizations are not on the agenda when evaluating IT investments, there is a risk that tax money invested in IT will not create corresponding value for the citizens. Government organizations responsible for local public organizations should reconsider how to support public organizations when investing in IT as the experience and knowledge of how to evaluate may be missing. To get support can be particularly important to local public organizations that have a low maturity level as the organizations are focusing on IT for the basic needs of the organization (as defined by the IT managers). Otherwise, future investments in IT may be the victim of defective assessments that will have undesirable consequences for the tax payers as the local public organization will just require more tax money. The question is who takes the responsibility? The tax payers often find it difficult to find information about irregularities in the public sector. In other countries Governments support IT investments. For instance, in the US the GAO (General Accounting Office) has published guidelines for the public organizations. In the Canadian provincial government of Ontario the Municipal Capital handbook supports the municipalities. This may be something that the Swedish government should be considering doing (McWatters et al. 2008).



### *A Stakeholder perspective*

A stakeholder perspective when discussing IS and IT investment is of importance as IS is a socio-technical system consisting both of technology and the people that are affected by the IS in different ways. Neglecting the different groups of stakeholders can have a serious impact on the outcome of IS. For example, when using Enterprise systems the information is often provided at one organizational level or department and analysis in another level or department. If there is not mutual understanding of the IS such as its purpose and expectations from different stakeholder groups it may be that the outcome is not as useful as it could be. For instance, those who provide information do not know what kind of analysis will be made and then they do not necessarily provide the information properly. Another problem with not involving the stakeholders is that, as in this case, the IS does not support the tasks of the users and this causes a great deal of extra work.

Therefore, who should be involved in the design process and in the evaluation process is of importance. In two of the organizations an IT council was suggested including managers with different roles and from different levels. The IT council was considered to have a great deal of positive impact on the organization such as better communication between different levels of the organization and the ad-hoc development of IS could be reduced. Having an IT council would also according to the managers; more easily identify, discuss and solve organizational issues. For example, conducting strategies were an issue that needed further attention in the organizations as none of the three organizations had evident strategies. In the third organization, the IT managers and business manager agreed that both should be part of the discussions concerning IT investments approval.

### *A design process*

A design process can also support managers in understanding and managing evaluation of IT investments. For instance the phase of *Representing* in the design process led to enhanced understanding of needs for the organization. According to the stakeholders involved what was the problem and how could it be improved. The phase of *Knowing* enabled managers to better understand established knowledge needed for solving the problem. The phase of *Designing* opened up for discussions among different stakeholder groups in the organization. The discussions involved both influences' by the stakeholders and support to thinking by established knowledge. For instance, first awareness of other stakeholders' perspectives and needs was created. Then their knowledge about IS evaluation was increased by the theoretical framework, see Table 7. Therefore this was an important phase, which in fact, meant that established knowledge interacted with the stakeholders' knowledge in order to make improvements for the organization and its specific context. The *Applying* phase made it evident for the stakeholders who wanted improvements and who did not. Also the adaption of the Value Case and the evaluation was possible. Finally the phase of *Evaluating*, enables the improvement of the capability of evaluating IT investments, and reduction of the failures of IT investments and investments in IT that can provide the organization with value from both an economic and stakeholders' perspective.

### 6.3 Limitations of the thesis

This study includes several limitations which will be further discussed in the following. First, this research project only involved public organizations. However, I suggest that the EaD approach is applicable to both the public and the private sector. In fact, the idea of Evaluating as Designing emerged when I was collaborating with an organization listed on the Swedish stock exchange. The CIO thought that the existing Business Case placed too much emphasis on economic aspects. It was suggested to be improved in order to make decision-makers better understand how initiated IT investments affect the organization and its surroundings. The decision attitude was improved by developing a Business Case focusing on measures of ROI to a multi-criteria perspective involving both the consideration of efficiency and effectiveness from both an economic and stakeholder perspective. In both the public and the private sector it could be of value to the organizations to improve IS evaluation by taking a design attitude that is balancing “Decision-making” as well as “Sense-making”.

A second limitation of this thesis is that the maturity level of IT investments was not reflected upon in the initial analysis of the organizations. If one organization has a low maturity level of IT investments the quality of the design phase might be improved if more time is given to explain the topic IS evaluation, identified issues and how evaluation of IT investments might be improved. Creating awareness of the maturity level will improve the understanding for the designer what the next step needs to be in order to support a qualitative development of IS evaluation. In the phase of evaluation several of the managers related the organizations to low maturity level as one reason to why the evaluation process was not changed to a larger extent. Some literature has stressed the importance of considering the maturity level. For instance, Curley (2007) has suggested a four- pronged strategy in order to achieve value from IT including managing the IT budget, the business value, the IT capability and managing IT like a business. In order to improve in each of these four strategies a maturity framework is presented. The maturity framework builds awareness among the managers of which stage they are in and from there what can be the next move. Taking too large a step or using too advanced a solution may fail the development of improvements as there are often some prerequisites that must be done before in order to succeed. As in this case, an evident strategy is essential in order to achieve value of IT investments Therefore, understanding the maturity level for accomplishing improvements in organizations is of importance.

A third limitation is that during the period of carrying out EaD in the different organizations some of the organizations were affected by structural changes that impact this research project. According to Mathiassen (2002), the researcher is dependent on how practice evolves and that the outcome of research is not easy to control. Therefore, the author also suggested a pluralistic research methodology. Coughlan and Coughlan (2002) mention that the desired outcomes of the action research approach are not a solution to the immediate problems. Important outcomes both intended and not intended, are also desired. I think it was interesting to find that most of the resistance to improvements was put up by the business and not by the IT managers. This implies a complex situation many IT managers are facing, to be

responsible for IT but not having the authority to affect how IT investments should be evaluated and introduced into the organization. One IT manager also mentioned that the cost of IT now was escalating in the organization without any control.

The fourth limitation of this research project is technology has in this research project basically been treated as a black box. The technology has not been in focus since the intent of this research project rather has been to focus on the interaction between the business and IT in a more general sense. The focus has been on EaD, an IS evaluation approach trying to continuously improve the organizations capabilities of evaluating value of IT investments.

## 7. Conclusion

I set out to explore how IS evaluations in organizations can be improved by inventing a novel approach that balances an economic and a stakeholder perspective. Drawing on organization and evaluation theory and extant IS evaluation literature, EaD was developed specifically as a means to help managers to adopt a new attitude towards evaluations of IT investments. In short, this new attitude involves moving away from rational decision-making and to conceptualizing IT evaluation as a design activity that seeks to create from a meta level capabilities for the organization to improve IS evaluation.

At the heart of EaD is the design process, which develops the evaluation process and Value Case to be applied at firm level in the organization. The Value Case can be understood as an outcome that supports managers' decision attitude by including different factors such as criteria that need to be reflected upon and also including the opinions of the stakeholders affected by the IS. The evaluation process is influenced by the stakeholder perspective and the managers will therefore be supported by other stakeholders representing the organization. EaD offers managers in organizations an iterative design process involving five phases that help them to arrive at a negotiated solution for how the organization can improve its capabilities of evaluating IT investments.

After applying EaD in three public organizations, it is suggested that EaD has the potential to guide balanced evaluations of IT in organizations. However, my study findings also indicate that the proposed approach can be further improved in order to increase its effectiveness. More research is therefore needed to better understand how business value can be co-created in evaluation situations, how evaluation activities can be organized in order to cater for multilevel interests, and how design action can be improved so that the creation of social and technical evaluation elements is handled properly.

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