Public Procurement of Information Systems

A dialectical analysis

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Doctoral Dissertations at the University of Agder 114

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Abstract

In this thesis I identify dialectics in public procurement of Information Systems (IS), and for some of the dialectics I identify synthesis. My study is based on a research gap, revealed through a literature review that I conducted. Public procurement in general and public procurement of IS in particular has been a neglected field of study. This is surprising, given the fact that public procurement account for a high proportion of the gross domestic product in the western world, and that procurement of IS especially is a highly complex task.

My literature review identified a lack of research on the challenges in public procurement of IS and a lack of research on the actual procurement process. Based on these findings, I conducted a Delphi study to identify the key challenges. This study found that some of the key challenges were related to requirements specification, but further, it found that key stakeholders (vendors, and CIO's and procurement managers in procuring entities) had different views on these key challenges. This led to my two main research questions: *What conflicting goals are held by public entities when procuring IS*, and: *What strategies do public entities use to cope with these challenges and with contradictory goals?*

To answer these questions, I conducted three in-depth interpretive longitudinal case studies. The three cases were from different procuring entities in two Norwegian municipalities. They differed in terms of type of system, in procurement procedure, and in what way they were organized. In all three cases I attended internal meetings and meetings with vendors taking part in the tendering process. I carried out interviews with project leaders, user representatives and vendors, and I was also granted access to internal documents in all three cases.

I applied dialectics and stakeholder theory as analytical lenses, to make sense of my data. Dialectics helps us detect the deep rooted contradictions in public procurement of IS. Bringing in stakeholder theory adds to our understanding why these contradictions occur, and how these may be solved.

Based on my findings, I offer several contributions. I identified five dialectics; none of these have been previously identified in the public procurement literature. The main dialectic, dialectic of requirement specification is examined in detail. Two syntheses to

this dialectic are identified; learning from networks and choice of a procurement procedure that allows more dialogue with vendors during requirements specification. Both these syntheses were applied in the cases. I developed a prescriptive framework for selecting procurement procedure, and finally the thesis offers an updated model of the public procurement system to guide future research on public procurement.

Like any thesis, mine has several limitations, which also points to areas for further research. My data are limited to three cases, all from Norwegian municipalities. My selection of interviewees was limited, and I only got access to meetings and interviews with some of the competing vendors.

I suggest future research on the dialectics of requirements specification and the choice of synthesis, as all public entities procuring IS face this challenge. I suggest future research in particular on stakeholder issues, and especially vendor issues, and cross-country studies as my contributions are all based on findings from Norway.

Contents

Glossary

Conflict is understood, in this dissertation, as a struggle for power or property or as a strong disagreement between people or groups.

Contract is defined as a binding agreement between two or more persons or parties, and a business arrangement for the supply of goods or services at a fixed price. Contracts for IS procurement generally include the actual system, or product, and additional services such as implementation with training, and maintenance and updates for a certain period. In the public sector, this period may be up to four years, with the option of extending it further.

Contradiction consists of opposites (i.e., a thesis and an anti-thesis), but not necessarily of conflicts, as a contradiction does not necessarily imply a struggle or a strong disagreement between people or groups with opposing views or goals.

Procurement can be defined as all strategic and operational processes required for the purchasing of products, and services, including the legal (e.g., contracting), logistical, financial, and administrative aspects of such purchases.

Procuring entity is an entity within an organization that is in the process of procuring a product or a service.

Stakeholder is a person or a group who is involved in or affected by a course of action.

Strategy is used to denote the action chosen by a procurement project group to deal with a challenge or a dialectical contradiction; this action can be a thesis, synthesis or antithesis.

Tender is a structured invitation to vendors to submit offers for the supply of products or services.

Tenderer is a vendor that submits an offer in a formal tendering process.

Vendor is an enterprise or a business selling a particular type of product or service.

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1. Introduction

This dissertation deals with the public procurement of Information Systems (IS). The term "information systems" encompasses a variety of very different types of systems, ranging from general, off-the-shelf office software to specialized systems, such as Enterprise Resource Planning (ERP) systems or those designed for niche sectors, such as public social services. In my study, I deal with the public procurement of the more specialized systems.

In this dissertation, I research the challenges faced by the public sector when it procures IS and the way in which public entities meet these challenges. This has been accomplished through a literature review, a Delphi study, and three case studies. The literature review served to identify key research issues and research gaps and, hence, to set the stage for my research. The literature review also identified a methodology gap: a need for processual studies. The Delphi study was carried out to identify the key challenges in the public procurement of IS and, hence, to focus the subsequent studies. The cases provided the opportunity to collect interpretive data on some of these key challenges. By applying stakeholder theory and dialectics as research lenses, I was able to identify dilemmas in terms of dialectical contradictions (i.e., thesis vs. antithesis), as well as possible syntheses and solutions.

1.1 Motivations of the dissertation

The public procurement of IS can be a highly complex process. One of the biggest challenges faced by procurement entities, concerns requirements specifications. Procurement units have to adhere to strict regulations enacted by policy-making bodies, such as the European Union (EU). These regulations require a transparent process, with equal opportunities for all vendors. As a consequence, the regulations burden the procurement units with the tasks of specifying precise requirements before vendors can submit their offers. These requirements cannot be changed once the offers are submitted. Whilst the requirements are often changing and incomplete, the regulations themselves are rigid (Ovaska, Rossi, & Smolander, 2005). Consequently, public entities find it a challenge to develop complete and clear specifications (Moe & Päivärinta, 2013).

Throughout this dissertation, I will use the term "tender" to denote a structured invitation to vendors to submit offers for the supply of specific products or services. A tender can be open to all or a restricted group of vendors. The term "vendor" is used to denote an enterprise that may place an offer to supply the requested goods, systems, or services. The term "procuring entity" is used to denote an organizational entity (e.g., an entity in a public unit, enterprise, or non-profit organization) that procures an item or a service. The process of requirements specifications carries the risk of specifying incorrect features or functionalities—and, thus, of missing opportunities. For a procuring entity, whether public or private, it is also difficult to evaluate offers against requirements specifications and to compare competing systems. Significant challenges arise in the procurement of larger and more specialized systems, and these challenges are not well studied. Further research on the procurement of IS is needed.

The procurement of IS in the public sector involves additional challenges beyond private procurement. Private companies are allowed to carry on a dialogue with one or more vendors and learn from them before finalizing their specifications; in fact, private companies may not even set any fixed specifications before they select a vendor. Some private companies may continue working with a vendor that they know well and are satisfied with, instead of using competition for a new procurement. The public sector, however, is constrained by a number of procurement regulations. These have been introduced to ensure fair and open competition, with equal opportunities for all vendors, irrespective of location. In the EU, two public procurement directives (2004/17/EC and 2004/18/EC) are in effect (Costantino, Dotolli, Falagario, & Sciancalepore, 2012). In the United States (US), public entities have to comply with the Federal Acquisition Regulation (FAR). Underlying the EU regulations are the principles of transparency and non-discriminatory competition (Cox, 1994). All public procurements in the EU and the European Economic Area (EEA) that are above a threshold value should be announced in advance, and all vendors should be given the same opportunity in competing for the procurements.

The public sector also deals with the complexity of satisfying different stakeholders' needs, which may conflict with one another. The conventional distinction between public and private organizations lies in ownership. Limited groups of entrepreneurs or shareholders own private businesses, but public agencies are owned collectively by the members of political communities (Boyne, 2002). Moreover, organizations that are

subject to political rather than economic controls are likely to face multiple sources of authority, which may conflict.

Due to the magnitude and complexity of the procurement of IS in the public sector, a better understanding of the process may produce substantial benefits for procuring entities. Government and utilities expenditure represents a significant and influential factor in the economy; in sum, it was estimated to account for 19% of the EU gross domestic product (GDP) in 2011 (Beuter, 2011). Hence, public procurement of IS can be expected to influence vendors to a large extent. Furthermore, procuring entities view IS as an investment that can be employed over a period of some length, typically four years or more; thus, new IS may carry great significance. To date, public procurement of IS has not been well researched. Thus, I hope that my contribution serves to facilitate a better understanding of the key issues and how to manage them.

1.2 Problem statement

This dissertation focuses on three broad research questions. The first research question is:

RQ1: What challenges are faced by public entities when procuring IS?

This first research question deals with the challenges inherent in procuring IS in the public sector in general. The term “challenge” has been defined as a difficult task or problem, something that is hard to do (Merriam-Webster, 2015). We need to identify the most important challenges, as well as the key issues, in order to focus our further research. To identify these challenges, we need a review of the research literature, and we need data from different stakeholders. A stakeholder is a person or group that is involved in or affected by a course of action (Merriam-Webster, 2015). In the public procurement of IS, the stakeholders are the chief information officer (CIO), the information technology (IT) staff with operational responsibility, the procurement managers, the financial managers, and the different users or user groups affected by the procurement. The stakeholders in the procurement of an information system may have different interests and hence different opinions on what the challenges are, depending on their roles and how they are affected by the procurement of the new system. I have collected data on the challenges faced from CIOs, procurement managers and vendors.

Different interests among the stakeholders may also result in different goals, depending on how stakeholders are affected, and these goals may be in conflict. This leads to the second research question:

> RQ2: What conflicting goals are held by public entities when procuring IS?

The second research question deals with the conflicting goals public entities hold when procuring IS. Conflicting goals can take different forms, they can, for instance, exist between different stakeholders, or they can be between the goals inherent in a process (e.g., the conflicting goals of following the legally correct procedures and of satisfying system needs). Some of these conflicting goals may be contradictory—and, hence, may require special attention. This leads to the third research question:

> RQ3: What strategies do public entities use to cope with these challenges and with contradictory goals?

The third research question is a natural follow-up of the first two, in which the goal is to understand and describe how public entities deal with these challenges, and with the contradictory goals. I have also elaborated on what consequences their actions and strategies may have. The term strategy in this context denotes the action chosen by a procurement project group to deal with a challenge or a dialectical contradiction, namely a thesis, synthesis, or antithesis. These research questions are answered in the five papers.

I conducted a literature review (paper 1) and a Delphi study (paper 2) to identify the major challenges in the public procurement of IS. Since no previous consensus on the key IS procurement issues exists, I chose a Delphi study to identify the most important issues and challenges. This study uses input from three different groups of stakeholders involved in procurement, procurement personnel, IS managers (CIOs), and sales managers at vendor companies.

Subsequently, data were collected as longitudinal studies by following three cases closely over time. I collected data from the time when the need for procurement was identified through to the specification of user requirements, the announcements of tenders, the selection of vendors, and the governance of the process to implementation.

I have based my work on an interpretive stance, collecting data through interviews with different stakeholders, observations in meetings, note taking and document analysis. These data have been analyzed by applying stakeholder management theory (paper 3) and dialectics (papers 4 and 5). This has given me the ability to gain a deeper knowledge and understanding of the process and the involvement of different stakeholders.

1.3 Contributions

My dissertation contributes by identifying key issues for research and the most important challenges. The literature review showed a need for research on the process of public procurement of IS, and for a longitudinal and processual research design. The Delphi study contributes by identifying the development of a requirements specification as the most challenging task. It further shows how different stakeholders differ on this issue.

The most significant contribution of the dissertation to theory is identifying a number of conflicting goals. Through a dialectical analysis; these conflicting goals are shown to be instances of five dialectics of the public procurement of IS:

1. Dialectic of requirements specification
2. Dialectic of change
3. Dialectic of the nature of change
4. Dialectic of implementation
5. Dialectic of risk

For each of these dialectics, I identified the corresponding resolutions applied in the cases. For some (dialectics no. 2, 3 and 4), the antithesis is represented by one or a group of stakeholders, and the resolution is related to the management of stakeholders. By applying Mitchell, Agle, and Woods' (1997) framework of stakeholder salience, I examine and explain the resolutions in these cases. The dialectic of requirements specification (1) and the dialectic of risk (5) are not related to internal stakeholders.

The dialectic of requirements specification is found in all three cases and is identified as the main dialectic. This dialectic may be unique to the public procurement of IS.

Developing requirements specifications is crucial for knowing what to ask for in a call for tender, but it is a difficult process. Furthermore, dialogue with vendors is prohibited by the regulations. This dialectic is examined in detail, and two possible strategies are identified, both of which are syntheses. The dissertation proposes a prescriptive framework for addressing this dialectic and selecting the appropriate procedure in practice. This framework should benefit practitioners, especially since the procurement of IS is an infrequent occurrence in most entities.

Finally, this dissertation proposes an updated conceptual model of the public procurement system, which may serve to conceptualize and organize future research.

1.4 Structure of the dissertation

This dissertation is composed as an integrative research summary, with seven chapters, and five individual papers. Following the rationale of the dissertation and my problem statement, which are presented in Chapter 1, the structure is as follows (see Figure 1.1).

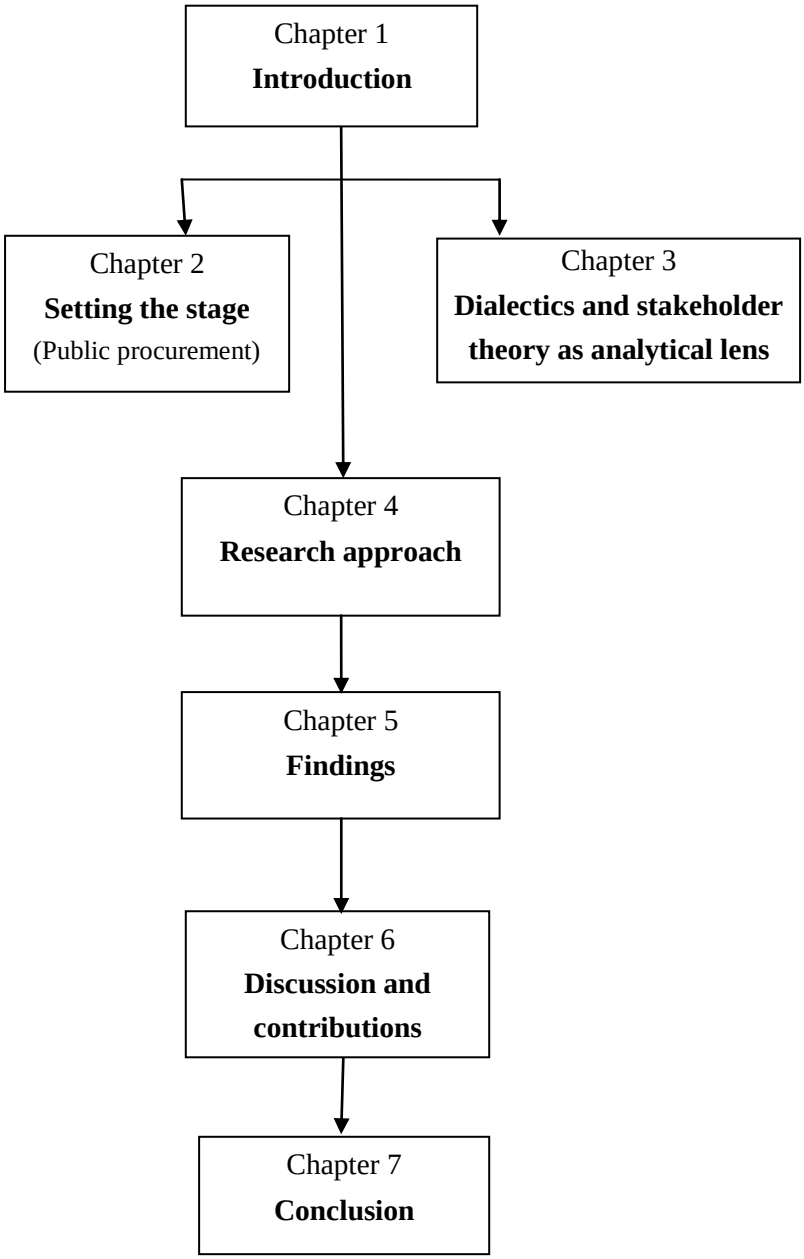

Figure 1.1: Structure of the dissertation

The next chapter sets the stage by defining the concept of procurement and its increasingly strategic role. It further deals with some of the specifics of public

procurement, including related rules and regulations and the issue of using procurement as an instrument for policy making. This discussion is presented in the form of an extended literature review of current research on the public procurement of IS, which synthesizes the findings for practice and positions my own research.

Chapter 3 provides an introduction to dialectical theory and stakeholder theory, which have been applied as a research lens to identify the conflicting goals and the deep-seated contradictions that underlie these conflicting goals in my case studies. Chapter 4 covers the research process and the methodology and provides an overview of the three cases. Chapter 5 presents the findings and engages in a further analysis of the cases. Chapter 6 presents and discusses the overall contributions of my dissertation to research and practice. Chapter 7 concludes the work with a summary of the dissertation, including a discussion of its limitations, and suggestions for future research.

2. Procurement

This chapter defines the concept of procurement and its increasingly strategic role. It also deals with some of the specifics of public procurement, and the procurement procedures in the EU/EEA area. The work presented here is based on my literature review in paper 1 (Moe, 2014), but extends beyond this by dealing with policy making and management (section 2.1.1), procurement regulations in the EU/EEA (section 2.1.2) and the organization and technology used in procurement (parts of section 2.1.3). Section 2.2 on procurement procedures in the EU/EEA is partly covered in paper 5.

In the 1990s, procurement became a more integral part of the public value chain, because services were increasingly being delivered by contract rather than by direct employment (Lyne, 1996). Companies were focusing more on their core competencies and outsourcing various activities to business partners, which caused procurement to become strategically more important (Rosemann, 2003). One activity that was extensively outsourced was the development of IS. In 2005, as a consequence of the increased importance of procurement, the Federal Acquisition Institute (FAI) of the US government raised the issue of improved professionalism among procurement personnel (Matthews, 2005).

Procurement can be defined as all strategic and operational processes required for the purchasing of products, and services, including the legal (e.g., contracting), logistical, financial, and administrative aspects of such purchases (Rosemann, 2003). Public procurement has been defined as "the acquisition (through buying or purchasing) of goods and services by government or public organizations" (Hommen & Rolfstam, 2009). Some people view public procurement as a more extensive process, encompassing purchasing, spanning the whole cycle, from identifying needs and acquiring products and services to the end of a service contract, or a product's life (Murray, 2009).

Procurement can be categorized as either partnership sourcing or adversarial competition (Parker & Hartley, 1997). Partnership sourcing implies outsourcing work (e.g., systems development) on a more or less regular basis to the same vendor. Adversarial competition refers to the rivalry between two or more vendors for a new contract. A contract entails a binding agreement for the procurement of both a product

(an information system) and a service, possibly including maintenance and updates for a number of years. Partnership sourcing involves a long-term collaboration based on trust between the procuring entity and the selected vendor, thereby avoiding the unnecessary costs of excessive tendering and frequent competitions. However, parties in the public sector in Europe must comply with European Community (EC) provisions for public procurement. One instrument that can be applied under these provisions is the so-called "Framework agreement," which allows a procuring entity to use the same supplier for up to four years after entering into a contract. Nonetheless, contracting authorities have to use normal EU procedures (i.e., open or restricted tendering, or tendering with negotiations) prior to entering into framework agreements.

Framework agreements are used to "establish terms governing contracts to be awarded during a given period, with regard to price, and where appropriate, the quantity envisaged" (EU, 2004b); hence, they are well suited for the procurement of IT hardware, but less so for software or IS, because a procuring entity will not normally procure more than one item of an information system. Different IS from one vendor will be priced differently, and any framework agreement would have to include all the different systems. Nevertheless, it is possible that a procuring entity would select a different vendor for a different system based on the requirements held.

The procurement of IS and IT services may be well suited for public procurement partnerships, because of their complexity (Lawther & Martin, 2005). Local authorities in the UK recognize that partnerships with certain suppliers are more likely to produce better value, than switching suppliers through the tendering processes (Loader, 2010). Framework agreements can be viewed as an arrangement of a public procurement partnership, which is allowed under the EU regulations. Framework agreements are particularly prevalent in the Nordic countries, but hardly used in Spain and Italy (Strand et al., 2011). However, research on the effects of public procurement partnerships have shown mixed results. Long-term partnerships can build social capital, leading to reduced transaction costs, and improved co-operative action. However, the effect may also be to reduce competition, and increase opportunism and transaction costs (Aritua, Smith, & Bower, 2011; Erridge & Geer, 2002). Table 2.1 gives an overview of the papers applied in my work on public procurement partnerships.

The selection of papers in table 2.1 and in tables 2.2 to 2.6 is based on relevance and significance and is aimed at illustrating the key issues. Thus, the selection is not meant to be complete.

Table 2.1: Overview of research papers on public-procurement partnerships

Topic	**Authors of the publications**
Public procurement partnerships, framework agreements	Aritua et al. (2011); Erridge and Geer (2002); Lawther and Martin (2005); Loader (2010); Strand et al. (2011)

Framework agreements are used for approximately 11 % of all contract award notices. Such notices are announced for all outcomes of tenders exceeding the EU threshold level, and this represents approximately 17 % of the total value of public procurement across EU and the European Economic Area (EEA), according to a survey (Strand et al., 2011). However, framework agreements require adversarial competition prior to the awarding of contracts (see section 2.1.2). Adversarial competition will be my focus in the following discussion.

2.1 Public procurement vs. private procurement

Whereas private companies are free to run procurement processes in the way they find most beneficial, public entities in large parts of the world must follow regulations. Furthermore, organizations that are subject to political (rather than economic) controls are likely to face multiple sources of authority that are potentially conflicting (Boyne, 2002). Hence, public procurement can be expected to be more complex than private procurement.

In his paper, Thai (2001) suggested a model of public procurement in action that has been frequently cited (Alkadry & Tower, 2006, 2011; Edquist & Zabala-Iturriagagoitia, 2012; Vaidya, Sajeev, & Callender, 2006). I have based my review of public procurement on this model, as shown in Figure 2.1. The model consists of a system of four interrelated boxes: “Policy making and management” (box 1), “Procurement regulations” (box 2), “Authorization and appropriations” (box 3) and all things that affect and are affected by the “Procurement function in operations” (box 4). In addition, there is feedback from procurement function operations, which is indicated by dotted lines. The procurement function in operations (box 4) is, according

to Thai (2001), the most complicated element of the procurement system. It represents managers and procurement personnel, organizational structures, procurement processes, techniques and methods. Moreover, it is influenced largely by policymaking and by management and procurement regulations — and, hence, will be different in the public sector and the private sector.

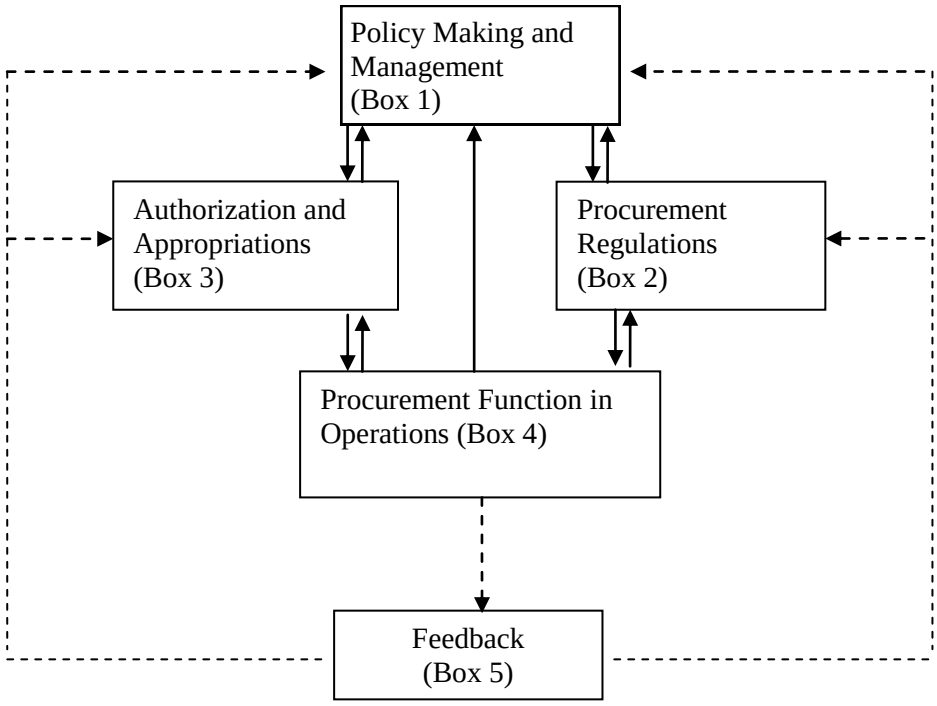

Figure 2.1: Model of a "procurement system in action" (Thai 2001). The solid lines indicate direct causal relationships. The dotted lines indicate delayed feedback and reforms/adjustments.

Politicians and citizens are concerned about the role that public procurement can play in serving policy goals; this issue (box 1) is covered in section 2.1.1. Spending taxpayers' money efficiently is also a major concern, as is achieving the best possible value for money. The public sector constitutes a significant share of the market, and business people emphasize the need for equal opportunities for competitors. Both of these concerns necessitate regulations (box 2), which are covered in section 2.1.2. Authorizations and appropriations of procurement personnel (box 3) appear to no longer be an issue in today's organizations, as paper no. 1 (Moe 2014) shows. Instead, these are taken for granted and expected to exist in organizations of any reasonable size, as paper no. 1 shows (Moe, 2014). The field of public procurement took significant steps towards becoming a respectable profession in the 1990s (Matthews, 2005); hence, authorization and appropriation might be less of a problem now than

was the case previously. My literature review (paper 1, Moe 2014) found very few papers on authorization and appropriations. Hence, I have not examined this issue separately however a couple of papers on organization (box 4) also cover authorization. The procurement function in operations (box 4) is covered in section 2.1.3.

Whilst Thai (2001) has been frequently cited, the model does have some important weaknesses. There is no justification for some of the arrows in the original paper, and, to my understanding, some of the arrows are incorrect. I will briefly comment on two of these:

1. Thai's (2001) model indicates that the procurement function in operations (box 4) affects policy making and management (box 1), whereas I would claim that this relationship is reversed.

2. The model indicates that regulations (box 2) affect and are affected by the procurement function in operations (box 4). Thai (2001) argued in his paper that US courts try all legal cases involving federal procurement with contract disputes and that their decisions become sources of federal procurement regulations. Hence, a procurement decision (the result of box 4) may affect regulations, and only with a time lag in cases that involve legal disputes (box 2). However, this applies only to the US.

Altogether, Thai's (2001) model is too simplistic, and lacks temporal factors. I suggest a revised model in Chapter 6. However, Thai's model (2001) identifies some specificities of public procurement (e.g., policies, regulations) and serves well in organizing my literature review. Furthermore, it serves as a means for organizing material on prior research.

2.1.1 Policy making and management

Policy making and management relate to the way in which procurement can be used as an instrument for specific policies, such as stimulating innovation, promoting the efforts of small and medium-sized enterprises (SMEs), applying green procurement, and promoting standardization and open software. According to Boyne (2002) public managers face multiple goals imposed by numerous stakeholders, in contrast with managers in private firms who pursue the single goal of profit. A survey from the UK

has shown that the goals of local government differ from those of the private sector (Murray, 2001), and that the procurement objectives of the private sector are inadequate for the public sector. The public sector constitutes a considerable part of the total economies in most parts of the world (e.g., public procurement has been estimated to account for 16% of the EU's gross domestic product (GDP) (Commision, 2014); thus, public procurement can be a powerful policy tool.

Public procurement must deal with a broad range of policy issues, such as (Thai 2006):

- balancing the dynamic tension between competing socioeconomic objectives, on the one hand, and national economic interests and global competition, on the other, as required by regional and international trade agreements;
- satisfying the requirements of fairness, equity, and transparency; and
- maintaining an overarching focus on maximizing competition.

These issues may clearly be conflicting or may even involve contradictory socioeconomic objectives; for example, supporting regional businesses will handicap other businesses and lead to unequal competition on a global level. Table 2.2 gives an overview of the papers applied in my work on specific policy goals and public procurement. These were drawn from a selection of papers I identified in my literature review (see section 4.1 and paper 1 for the procedure on the identification and selection of papers and paper 1 for the literature review).

Table 2.2: Overview of selected research papers on "Policy making and management"

Policy goal	**Authors of the publications**
Innovation	Dalpe (1994); Pavitt and Walker (1976); Roessner (1979); Caldwell (2005); Edler and Georghiou (2007); Aschhoff and Sofka (2009); Hommen and Rolfstam (2009); Uyarra and Flanagan (2010); Guerzoni and Raiteri (2012); Georghiou et al. (2013)
Market, SMEs	Furlong et al. (1994); Bartle and Korosec (2003); McCrudden (2004)
Green procurement	Borg et. al. (2006); Michelsen and Boer (2009); Varnäs et al. (2009)
Standardization and open source software	Sieverding (2008); Guijarro (2009)

The function of participating in the market as a procurer can be simultaneously combined with using procurement power to advance concepts of social justice, as has been seen in a number of cases (McCrudden, 2004). A survey of procurement in 48 US states has shown that a variety of social preferences are used in vendor selection (Bartle & Korosec, 2003). In the UK, government policies were changed to make it easier for small- and medium-sized enterprises (SMEs) to compete for tenders in public procurement from 1992 (Furlong, 1994). Prior to that date, SMEs in the UK had encountered barriers to entry resulting from protectionist practices.

The pursuit of competitive markets is highly complex (Caldwell et al., 2005). Case studies show some of the impediments, such as the need to offer consistent work to suppliers in order to attract the best vendors and to gain access to innovation (Caldwell et al., 2005). Public procurement can be used as a means for stimulating innovation (Dalpè, 1994; Edler & Georghiou, 2007; Pavitt & Walker, 1976; Roessner, 1979). EU policymakers have increasingly encouraged the "public procurement of innovative products and services" as a policy instrument appropriate to realizing the goals for raising private sector research and development (R&D) investment (Hommen & Rolfstam, 2009). Results from a survey of a large sample of German companies (Aschhoff & Sofka, 2009) have shown that public procurement has significant positive effects on innovation success. More recent work has also underlined the effect of public procurement on innovation (Georghiou, Edler, Uyarra, & Yeow, 2013; Guerzoni & Raiteri, 2012; Uyarra & Flanagan, 2010).

The 2004 EU directives on public procurement allow the inclusion of environmental considerations in the contract awards process. All official bodies in Norway have a legal obligation to take the environmental performance of products into consideration. Whilst the requirements of the Public Procurement Act are far from fully implemented (Michelsen & Boer, 2009), findings from a survey have shown that both public and private clients in Sweden take environmental issues into consideration in their procurement process (Varnäs, Balfors, and Faith-Ell, 2009). A European study (Borg et al. 2006) has described some of the barriers for the procurement of energy efficient products and how these can be overcome to achieve energy efficiency and climate protection through public procurement.

Standardization and e-government interoperability influence the public procurement of IS in both the US and the EU (Guijarro, 2009). Based on three case studies, Sieverding

(2008) recommended procurement policies that are neutral with respect to open source software, or specific technologies in general, preferring to choose the best alternatives for particular situations.

These findings indicate that the public sector may use procurement as a means for quite different public goals, such as stimulating regional businesses and innovation, fighting corruption, promoting green production, and promoting standardization. However, the effects may not be completely as intended. Indeed, public procurement may also have negative effects on SMEs and on corruption. We do not know to what extent or how policy goals come into play in the public procurement of IS. Policy goals can be conflicting and lead to dilemmas. One obvious dilemma exists between the goals of stimulating the business community in a single region and giving equal opportunities to all businesses. With this in mind, many countries, including the EU and the EEA, have set public procurement regulations.

2.1.2 Procurement regulations in the EU/EEA

The EU introduced new procurement regulations from between 1988 and 1992, upon which the current public procurement directives (EU, 2004a, 2004b) are based. A considerable part of the research I have identified in this area was published before the year 2000; table 2.3 gives an overview of the selected papers.

Table 2.3: Overview of selected research papers on "Procurement regulations"

Topic area	**Authors**
General background	McGowan (1991); Müller (1991); O'Brien (1992); Martin et al. (1999)
Level of "commitment" / adherence	Cox (1994); Erridge and Nondi (1994); Furlong et al. (1994); Vagstad (1995); Cox and Furlong (1997); G. L. Jones (1997); Hoekman (1998); Martin et al. (1999); Evenett and Hoekman (2005); Gelderman et al. (2006); Strand et al. (2011)
Corruption	Celentani and Ganuza (2002); Csáki and Gelleri (2005); Auriol (2006); Grødeland and Aasland (2011)
Effects of regulations on the market	Karjalainen and Kemppinen (2008); Loader (2011); Loader (2013); Meyer (2014)

Prior to 1992, procurement practices favored the national suppliers—and, thereby, protected local suppliers, leading to relatively inefficient high-cost industries being sustained and customers having to pay more than necessary (McGowan, 1991). A mixture of a lack of standards and government-owned telecommunications companies with monopolies had led to an inefficient market and a lack of potential for growth for companies in the telecommunications sector (Müller, 1991). It was expected that substantial public expenditure savings could be gained by introducing new regulations and by overcoming protectionist sentiments (Martin, Hartley, & Cox, 1999; O'Brien, 1992).

The overarching goal of EU legislation is to open up competition throughout the EU, with transparency and equal opportunities for all vendors. The legislation on public procurement also applies to the EEA. The current regulations require public entities to publicly announce calls for tenders for all procurements above a certain threshold level in the EU's Tender Electronic Database (TED). This threshold level is updated every second year, and is currently (2015) set at 207,000 Euro for products and services including IS. The regulations (EU, 2004b) further specify four main procedures: open tender, restricted tender, tender with negotiations, and competitive dialogue. The latter two are only allowed in certain cases (see section 2.1.3 for further discussion). The regulations also specify minimum deadlines for submitting tenders.

In addition the regulations allow aggregated procurement through the use of framework agreements "between one or more contracting authorities and one or more economic operators" (see article 33 in (EU, 2004b)). The purpose of such agreements is to govern contracts awarded during a given period, particularly with regard to price and quantity. These agreements should not exceed four years. However, framework agreements can only be awarded after applying the procedures mentioned previously.

The regulations also allow dynamic purchasing systems (article 34 in (EU, 2004b)), but only for commonly used purchases, such as e.g., office utensils or furniture for schools. All candidate tenderers who satisfy the selection criteria and submit an indicative tender that complies with the specification can be admitted to the system. This system requires that procuring entities apply the open tender procedure in all its phases up to the award of the contract.

A new EU directive on public procurement (EU, 2014b) is to be implemented in 2016. This directive will allow the use of innovative procurement as a procedure, but only after applying tender with negotiations.

No proposed procurement of products and/or services may be subdivided to artificially keep procurements below the threshold level. If, however a public procurement is below the lower level, a procuring entity still has to compare prices from different vendors and choose the best offer. To accommodate transparency, a number of means are applied. All tenderers should be informed as soon as possible of decisions concerning the award of a contract. Unsuccessful tenderers should be informed of the reasons for the rejection of their tender, if they request this information. In addition, contract notices should be published for all contracts above a threshold level, so that all vendors have an opportunity to learn about procurements (contract notices are announcements of procurement contracts that have been awarded). Furthermore, all procurements above a threshold value should be documented, so that vendors and procurement authorities can ensure that regulations have been followed.

To accommodate equal opportunities, the regulations specify that all tenderers should have access to the same information. Only two award criteria are allowed: the lowest price and the "most economically advantageous tender" (MEAT). The public procurement of IS may apply MEAT as a criterion. MEAT may be a combination of price, quality of user interface, and the extent to which the system meets the requirements specifications. A public procuring entity normally has to specify the criteria and the relative weighting given to each one in its tender announcement. Similar regulations exist in other countries/regions (e.g., the Federal Acquisition Regulation (FAR) in the US). Attempts to agree on global regulations (e.g., in the "Doha development round") have also been made.

However, soon after the new EU legislation was introduced, barriers to entry in the public markets were identified (Cox, 1994), and there were indications of protectionism for public and utilities contracts (Cox & Furlong, 1997). An early survey from Northern Ireland (Erridge & Nondi, 1994) showed that practice conformed to a hybrid of the competitive model and partnership model, despite EU regulations. Surveys have shown large variations in how different countries have complied with regulations (Martin et al., 1999) and the instruments used by governments to achieve competition (Hoekman, 1998; Strand et al., 2011). A number of studies have found

disappointing results for the impact of the EU directives on the numbers of tenderers (G. L. Jones, 1997), border trade, competition, and prices (Gelderman, Ghijsen, & Brugman, 2006). There are also indications of an impact (Furlong, Lamont, & Cox, 1994) in terms of a considerable effect on non-discrimination and transparency (Evenett & Hoekman, 2005; Vagstad, 1995).

Regulations on public procurement are expected to lead to lower levels of corruption; however, the research shows mixed results. On the one hand, formal decision processes can prevent corruption (Csáki & Gellerí, 2005). On the other hand, corruption may be higher in a more competitive environment (Celentani & Ganuza, 2002). The public procurement framework does not prevent facilitation payments, a payment to foreign officials which is not considered to be bribery, but are still considered to be questionable (Auriol, 2006). Indeed, public procurement officials throughout post-communist Europe have a high degree of "bargaining power" (Grødeland & Aasland, 2011). The regulations may also have an effect on the market, especially on SMEs. A survey carried out in Finland (with a very low response rate) showed that SMEs were hindered in procurement competitions because of a lack of legal expertise and administrative resources, such as electronic systems (Karjalainen & Kemppainen, 2008). Studies from the UK have shown that small firms face additional burdens and barriers and, thus, may benefit from a partnership approach (Loader, 2011, 2013).

These findings indicate that there has been a move towards the public announcement of tenders and tendering in line with EU regulations, although it has not been as complete as expected, and that different forms of public-private partnerships have been applied as a means of ensuring best value. The overview also shows that an effect of the regulations may be that SMEs are excluded, because the regulations have been criticized for creating excessive and unnecessary bureaucracy (see e.g. (Meyer, 2014)).

2.1.3 Procurement functions in operations

The procurement function in operations represents managers and procurement personnel, organizational structures, and the procurement process, techniques and methods found in Thai's (2001) model of public procurement in action. Tables 4 through to 6 summarize the findings related to this "box" from my literature review (paper 1 - Moe, 2014). I have split the procurement function in operations into three categories: "Technology for procurement" (e-procurement, table 2.4), "Organization

of procurement" (table 2.5) and "The procurement process" (table 2.6). This categorization is based on careful reading of all of the abstracts in the literature review. In this section, I will provide a brief overview of some of the findings on e-procurement and on the organization of procurement, before focusing more on the process of procurement. The procurement function in operations—and, especially, the procurement process itself - include the issues that I expect to differ between the procurement of IS and procurement in general. My focus in this dissertation is public procurement of IS. In paper 1, I give a thorough overview of the research on the public procurement process for IS.

The use of technology for procurement has been an issue since the late 1990s (see table 4 for an overview of selected papers). There is a considerable body of work on on-line procurement, or e-procurement, in both the public and private sectors (see for example (Davila, Gupta, & Palmer, 2003; Gebauer, Beam, & Segev, 1998; Hardy & Williams, 2007; Hsiao & Teo, 2005; Moon, 2005)). However, none of these papers have specifically covered procurement of IS. The introduction of automated online processes was expected to change the role of the purchasing department from a transaction-orientation to a more managerial one, focusing on establishing and maintaining relationships (Davila et al., 2003; Gebauer et al., 1998). Benefits identified include relieving procurement staff of laborious routine work and an emphasis on strategic issues (Kothari, Hu, & Roehl, 2005), as well as improving compliance and reducing maverick spending (Croom & Brandon-Jones, 2007). A study also shows that the shift towards e-procurement has excluded micro-entrepreneurs (Kleine, 2009).

Table 2.4: Overview of selected research papers on "Technology for procurement"

Topic area	**Authors**
Benefits and disadvantages from of e-procurement	Gebauer et al. (1998); Davila et al. (2003); Hsiao and Teo (2005); Kothari et. al. (2005); Moon (2005); Hardy and Williams (2007); Croom and Brandon-Jones (2007); Kleine (2009)
Public e-procurement	Panayiotou et. al. (2004); Henriksen and Mahnke (2005); Moon (2005); Vaidya et. al. (2006); Hardy and Williams (2007)

A number of papers on e-procurement for specific purposes and industries have been published, including some on governmental purchasing (Hardy & Williams, 2007; Panayiotou, Gayialis, & Tatsiopoulos, 2004). Some of these have focused on challenges in the implementation of e-procurement systems in the public sector (Henriksen & Mahnke, 2005; Moon, 2005; Vaidya et al., 2006). However, the procurement of IS is probably too complex a process to be carried out through e-procurement. Findings from a field study of 26 firms show that the benefits of e-procurement are more likely when the items purchased have explicit requirements or are manufactured according to common quality standards, and when there is a large pool of suppliers available (Hsiao & Teo, 2005). Explicit requirements for IS can be difficult to develop, and there is often a limited number of suppliers for specific applications. E-procurement software generally only supports a part of the procurement process: the purchasing part, including the auction.

Organizing the procurement process spans diverse issues, such as the degree of formalism and bureaucracy in carrying out the function, and the level of centralization/decentralization and whom to involve. Table 2.5 gives an overview of selected research papers covering these issues.

Table 2.5: Overview of selected research papers on "Organization of procurement"

Topic area	**Authors**
Level of formalization	Spekman and Stern (1979)
Centralization of authority	Bartle and Korosec (2003); Karjalainen (2011); Karjalainen and Raaij (2011); Lempinen and Tuunainen (2011)
Who to involve	Howcroft and Light (2002, 2006); Matthews (2005); Kamann (2007)

An early survey of firms in the greater Chicago area indicated that the buying group tends to reflect a fairly bureaucratic structure, but that greater uncertainty and need for information lead to more relaxed role prescriptions and to joint participation in decision making (Spekman & Stern, 1979). Although this reference is rather old, the finding may still have some relevance. The procurement of IS involves great uncertainty and requires substantial information, both in developing a request for tender and in selecting a vendor.

One important research issue has been the centralizing/decentralizing of the procurement authority and a number of papers cover this issue (see table 2.5). Survey data from the Finnish government has shown that limiting the task autonomy of the procuring entity within an organization, can reduce all types of procurement that do not follow the policies of the organization (Karjalainen & Raaij, 2011). Price and cost savings may result from centralizing procurement. The quest for global efficiency and effectiveness may have led to increased centralization and coordination of the purchasing functions (Karjalainen, 2011). A study of state procurement in the US (Bartle & Korosec, 2003) found that the level of centralization in decision making is highly influenced by the expected cost of a contract and the specific service area - information technology being one of the areas with the largest contracts. A radical way to centralize is to set up a company to act as a "middleman" entity between the procuring entity and the vendor to negotiate lower prices and reduce duplicated effort; however, a case study has shown how there can be an incentive to bypass this middleman in order to save transaction costs (Lempinen & Tuunainen, 2011).

Organizing the procurement work further includes issues such as who to involve in procurement projects, in which functional areas of an organization the participants reside (e.g., procurement personnel, IS staff, management, user representatives), and what their roles should be in the process. IS personnel should be involved in the procurement process, as procurement of IS normally requires some technical competence. Furthermore, involving end users is of vital importance, as the identification and an understanding of requirements is essential (Howcroft & Light, 2002, 2006). Due to the legal regulations, the process also needs the participation of the procurement staff (Matthews, 2005). A normative model based on stakeholders' power and level of interest, has been suggested (Kamann, 2007); however, there are no data available to support this model. I have only seen a few limited findings on the issue of who to involve in the process.

The composition of the procurement process may vary by organization and even within an organization in terms of procurement procedures and buying situations. Knowledge about whom to involve, and the division of roles is vital. However, this issue is beyond the scope of this dissertation. Related to this issue is the question of how to organize the work in phases or tasks, from starting the process to contract signing and then to implementing a system. Table 2.6 gives an overview of selected papers that cover this area.

Table 2.6: Overview of selected research papers covering "The procurement process"

Topic area	**Authors**
Division in phases in public procurement	Bradley (1977)
Division in phases, procurement of information services	F. E. Webster and Wind (1972)
Division in phases, IS procurement	Poon and Yu (2010); Verville and Halingten (2003)

An early paper on procurement in Ireland's public sector (Bradley, 1977) specified four phases: the purchase initiation, the survey of kinds of equipment, the supplier short-listing (including the tender announcement), and the awarding of contracts. F. E. Webster and Wind (1972) suggested a five-stage model for the decision process in procurement of scientific and technical information services. The composition of procurement processes may vary by organization—or even within an organization (e.g., by buying situation) (F. E. Webster and Wind, 1972). The focus on IS procurement, however, is limited in these early studies. The organization of the procurement of IS can be expected to differ from the way that the procurement of most other items is organized, because of the high uncertainty and the need for information inherent in procurement of IS. In my literature review I did not find any papers on phase division in the public procurement of IS; however, I identified two papers on phase division in private procurement of IS.

Two models of procurement of Enterprise Resource Planning (ERP) systems are of interest (Poon & Yu, 2010; Verville & Halingten, 2003). Both of these models place considerable emphasis on requirements specification and on involving cross-functional multidisciplinary teams in the phase models they suggest. These papers are, however, based only on data from the private sector. I expect public sector procurement to be different in many ways, because of political controls and procurement regulations.

Procurement regulations imply the organization of the procurement process of goods and services above the EU's threshold level into the following phases: development of the request proposal (for the tender announcement), tendering (during which the vendors prepare their bid), selection (possibly including negotiations), contracting,

implementation, and completion (Moe, 2014). See figure 2.2 for an overview of a simplified, generic process. In the US, public entities must comply with the FAR; other countries have similar regulations.

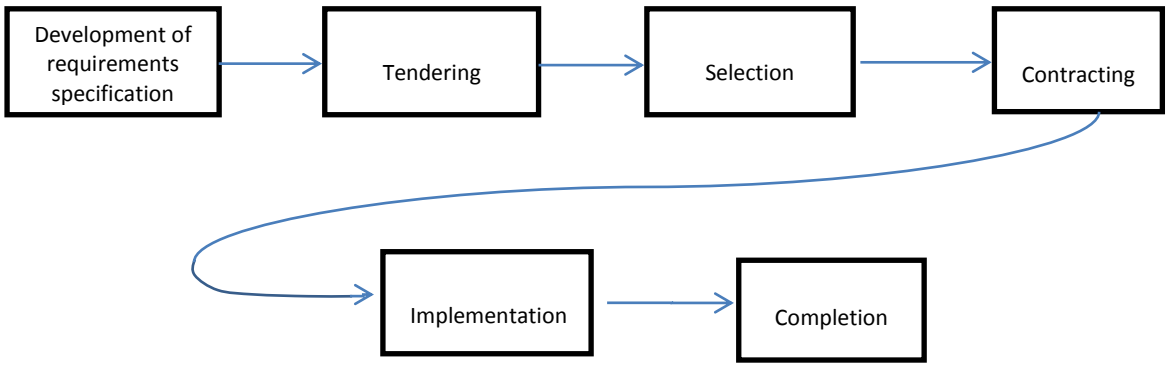

Figure 2.2: Overview of a generic public procurement process

Each of these phases can be viewed as processes in themselves, involving one or more tasks and stretching over some time. For instance, tendering will involve the announcement of the call for tender from the procuring entity, as well as the tenderers' preparations of their offers. Communication between the procuring entity and the tenderers will also be a part of this process, since the tenderers may request more information, which the procuring entity will send to one (or possibly all) of the tenderers. Selection may involve demonstrations of software, reference checking, and ratings of the different offers. Table 2.7 shows the tasks in each phase (this table and tables 2.8 to 2.11 are all based on observations from my cases, and serve as an illustration, without claiming to be complete).

Table 2.7: Overview of phases and tasks that may be included in each phase in public procurement of IS

Phase	**Tasks**
Development of requirements specifications	• Identifying user wishes (e.g., through brainstorming) • Collecting requirements specifications from collaborating procuring entities (e.g., other municipalities) • Checking vendor options • Engaging in a dialogue with vendors (in competitive dialogue) • Screening internal wish lists and borrowing requirements specifications • Selecting actual requirements
Tendering	• Announcing the call for tender • Vendors prepare their offers • Communication between the procuring entity and tenderers (i.e., clarifying open issues) • Vendors submit their offers
Negotiations (this phase is included only in the procedure of tendering with negotiations)	• Determining how (and if) requirements are met • Negotiating price, training, implementation schedule and options to include
Selection	• Demonstration of offers • Checking references from other public entities that have procured the offered solutions • Rating
Contracting	• Checking suggested contract • Signing contract
Implementation	• Training super users and end users • Converting "old" data • Building the "infrastructure" • Installation • Correcting errors and flaws
Completion	• Ensuring that the system is delivered as contracted • Issuing final payment

In the EU member countries, all public procurements expected to be above the threshold level of €207,000 must be announced through the EU's Tender Electronic

Database (TED). This makes the call visible to vendors all over Europe, such that all vendors may be given the same opportunities, irrespective of location. This tender, in itself, is a fairly bureaucratic and tedious process; hence, there may be a contradiction between running an efficient and quick process and announcing the tender according to regulations. Some countries have additional national threshold levels beyond which a call must be announced through the national database (e.g., Norway at NOK500,000 and Denmark at DKK500,000). However, even if a public procurement is below this lower level, a procuring entity is obliged to compare prices from different vendors and choose the best offer. My findings are from Europe; hence, I will give a short overview of how public procurement is carried out under EU/EEA regulations.

2.2 The procurement procedures in the EU/EEA

EU regulations specify four main procedures for public procurement: open tendering, restricted tendering, tendering with negotiations (in which some or all of the competitors are invited for negotiations before contractor selection), and competitive dialogue. The latter is a fairly new instrument. It was introduced in 2004 as a response to a lack of flexibility in particularly complex projects (EU, 2005). The three other procedures originate from the "old" Directive (Council Directive 92/50/EEC relating to the coordination of procedures for the award of public service contracts) (EU, 1992). However, the negotiated procedure is only allowed in exceptional cases.

Tendering with negotiations is allowed in the case of services and intellectual services involving the design of works, where the services to be provided cannot be established with sufficient precision ((EU, 2004a), Article 30). IS fit the criteria well; hence, I expect that this procedure is most commonly applied for the public procurement of IS. Competitive dialogue is only permitted for particularly complex contracts ((EU, 2004a), Article 29) in markets with technical, legal, or financial complexity. Technical complexity involves situations in which a contracting authority may not be able to determine which of several possible solutions would be best suited to satisfy its needs (EU, 2005). Legal or financial complexity arises "very often in connection with public-private partnerships" (EU, 2005), and competitive dialogue was created with the aim of making public-private partnerships easier (Barlow, Roehrich, & Wright, 2010).

In all of these procurement procedures, the development of requirements specifications is an important task, as found by Poon and Yu (2010) and Verville and Halingten (2003) The simplest procedure is **open tendering**, in which all vendors can compete based on a tender announcement and a frozen requirements specification. However, the procuring entity may specify exclusion criteria; that is to say, it may exclude tenderers based on such grounds as certification, economic and financial standing, and technical abilities. After the selection, the process is basically the same, irrespective of procedure; hence, the final phases (i.e., contracting, implementation and completion) are not shown in figures 2.3 through to 2.6. Open tendering is by far the most commonly applied procedure in the EU, accounting for 73% of all contract notices and 52% of the overall value of public procurements in the period between 2006 and 2010 (Strand et al., 2011). However, there are variations among different countries, and the share of open tendering is considerably lower in the UK, representing around 30% of the contract notices (Strand et al., 2011). Figure 2.3 shows the procedure for such tenders. Table 2.8 gives an overview of the phases and corresponding tasks that may be included.

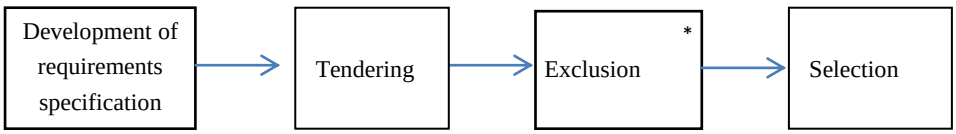

Figure 2.3: Overview of phases in open tendering. Exclusions may be applied if the exclusion criteria are specified in the tender announcement. The exclusion phase is marked with an asterisk (*) to denote that it is optional.

Table 2.8: Overview of phases and corresponding tasks in open tendering

Phase	**Tasks**
Development of requirements specifications	• Identifying user wishes (e.g. through brainstorming) • Collecting requirements specifications from collaborating procuring entities (e.g., other municipalities) • Checking vendor options • Screening internal wish lists and borrowed requirements specifications to finalize the actual requirements
Tendering	• Announcing the call for tender • Tenderers prepare their offers • Communication between procuring entity and tenderers, clarifying open issues • Tenderers submit their offers
Exclusion	• Accept or exclude tenderers based on predefined criteria
Selection	• Determining how (and if) requirements are met (internally) • Demonstration of offer • Rating

In **restricted tendering**, vendors are invited to submit documentation for pre-qualification. The procuring entity can specify the maximum number of vendors allowed to compete, as well as the selection criteria that will apply. The minimum number of vendors is five. The development of requirements specification may be carried out in parallel. More than half of all procurements in the UK use this procedure, whereas, for the EU overall, this procedure only accounts for 9% of the total number (Strand et al., 2011). The mean value of procurements applying this procedure is higher than that for procurements which apply other procedures. In the period between 2006 and 2010, it was nearly 8.3 million euros, which is more than twice the mean value of 3.1 million euros for all procurements, irrespective of the procedure applied (Strand et al., 2011). In actuality, most contracts have relatively low values; for example, more than half of all contracts in this period had values below 390,000 euros (Strand et al., 2011). Accelerated restricted tendering may be applied in cases with extreme urgency (EU, 2004b). This allows the procuring entities to fix shorter deadlines; however, the procedure is basically the same. This procedure is shown in figure 2.4. Table 2.9 gives an overview of the phases and their corresponding tasks.

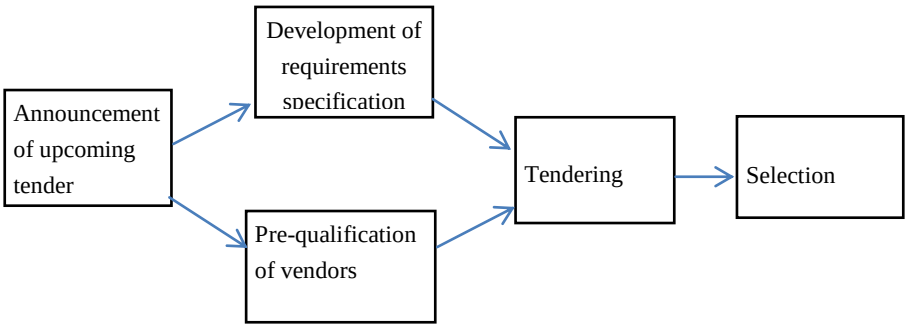

Figure 2.4: Overview of phases in restricted tendering

Table 2.9: Overview of phases and corresponding tasks in restricted tendering

Phase	**Tasks**
Announcement of upcoming tender	• Announcement of invitation to submit documents for pre-qualification
Development of requirements specification	• Identifying user wishes (e.g., through brainstorming) • Collecting requirements specifications from collaborating procuring entities • Checking vendor options • Screening internal wish lists and borrowed requirements specifications to finalize the actual requirements
Pre-qualification	• Accepting or excluding tenderers based on predefined criteria or on chances for winning the tender, if the minimum number of tenderers is met
Tendering	• Announcing the call for tender to the qualified vendors • Tenderers prepare their offers • Communication between procuring entity and tenderers, clarifying open issues • Tenderers submit their offers
Selection	• Determining how (and if) requirements are met (internally) • Demonstration of offer • Rating

Negotiated procedures also allow for pre-qualification. The procuring entity can carry out negotiations on all aspects of the offer, including technical features, price, and other contract issues. This procedure is only allowed when the technical specifications cannot be established with sufficient precision ((EU, 2004b); hence, the procurement of IS does qualify. If there are three or more qualified vendors, at least three must be invited to participate in the negotiations. This procedure was used in 9%

of all tender announcements in the period between 2006 and 2010 (Strand et al., 2011); however, it was used in nearly 20% of all tender announcements in Belgium and Norway (Strand et al., 2011) during that time. A negotiated procedure may be applied without publishing a contract notice in a limited number of cases (Article 31), two of which are of specific relevance. The first is when no suitable tenders have been submitted in response to an open procedure or a restricted procedure (provided that the initial conditions of the contract are not altered). The second relates to supply contracts for additional deliveries by the original supplier, which are intended as extensions of existing installations.

A negotiated procedure is shown in figure 2.5. Table 2.10 gives an overview of the phases and their corresponding tasks.

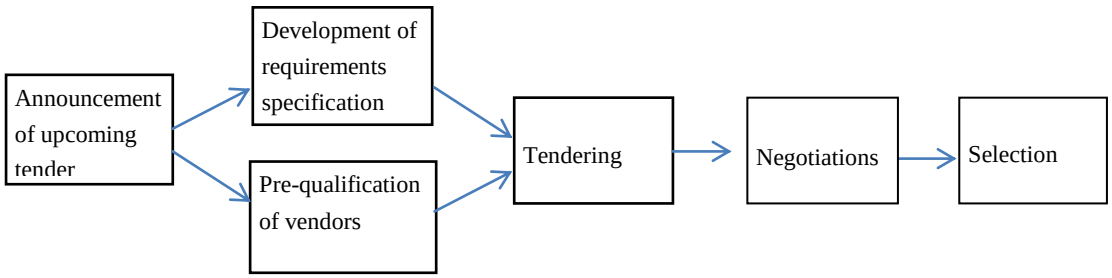

Figure 2.5: Overview of phases in tendering with negotiations.

Table 2.10: Overview of phases and corresponding tasks in tendering with negotiations

Phase	**Tasks**
Announcement of upcoming tender	• Announcement of invitation for venders to submit documents for pre-qualification
Development of requirements specification	• Identifying user wishes (e.g., through brainstorming) • Collecting requirements specifications from collaborating procuring entities (e.g., other municipalities) • Checking vendor options • Screening internal wish lists and borrowed requirements specifications to finalize the actual requirements
Pre-qualification	• Accepting or excluding tenderers based on predefined criteria or chances for winning the tender, if the minimum number of tenderers has been met
Tendering	• Announcing the call for tender to the qualified vendors • Tenderers prepare their offers • Communication between procuring entity and tenderers (i.e., clarifying) • Tenderers submit their offers
Negotiations	• The procuring entity selects tenderers with which to negotiate • Negotiations (including one or more physical meetings, online meetings, or telephone meetings) • Determining how (and if) requirements are met (internally) • Demonstration of offers
Selection	• Rating

In **competitive dialogue**, the procuring entity carries out a dialogue with the vendors that are selected after pre-qualification. They do so before finalizing the award criteria and receiving the offers from these vendors. This procedure is only allowed for very complex contracts ((EU, 2004a) in markets with technical, legal, or financial complexity. Technical complexity involves situations in which a contracting authority may not be able to determine which of several possible solutions would be best suited to satisfy its needs (EU, 2005). At least three vendors must be invited. The procedure does not allow negotiations after the offers have been submitted; however, the vendor that has submitted the most advantageous offer may be asked to clarify aspects of its proposal. The dialogue may continue over several individual meetings with the

vendors, and the number of vendors may be reduced through consecutive stages. The dialogue serves as an input to the requirements specifications.

Competitive dialogue is the least used of the four procedures, accounting for only 0.4% of contract notices in the EU in the period between 2006 and 2010 (Strand et al., 2011). However, this procedure accounted for 8.6% of the total value of all contract notices in 2010 (Strand et al., 2011). Again, there are large country variations; for example, in the UK, this procedure accounted for approximately 1.4 % of all contract notices, whereas it was hardly used in Germany, Spain, Poland, or Italy, and was not used at all in smaller countries such as Cyprus, Malta, Luxembourg, and Lichtenstein (Strand et al., 2011). Figure 2.6 shows the process. Table 2.11 gives an overview of the phases and corresponding tasks that may be included.

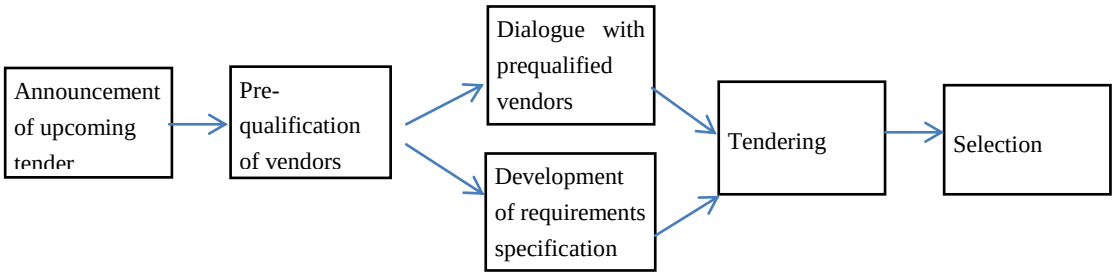

Figure 2.6: Overview of phases in competitive dialogue

Table 2.11: Overview of phases and corresponding tasks in competitive dialogue

Phase	**Tasks**
Announcement of upcoming tender	• Inviting venders to submit documents for pre-qualification
Pre-qualification	• Vendors wishing to participate submit the requested documentation • Accepting or excluding tenderers based on predefined criteria or on chances for winning the tender, if the minimum number of tenderers has been met
Dialogue with prequalified vendors	• Dialogue meetings • Follow-up questions from tenderers (generally over e-mail) • Informing all tenderers of information given to specific tenderers
Development of requirements specification	• Brainstorming, identifying user wishes • Collecting requirements specifications from collaborating procuring entities (e.g., other municipalities) • Checking vendor options • Screening internal wish lists and borrowed requirements specifications to finalize the actual requirements
Tendering	• Announcing the call for tender to the qualified vendors • Tenderers prepare their offers • Communication between procuring entity and tenderers (i.e., clarifications) • Tenderers submit their offers
Selection	• Determining how (and if) requirements are met (internally) • Demonstration of offer • Rating

A minimum number of days should be set for each step in each procedure to give vendors sufficient time to prepare their offers and answer requests for information. The process should be transparent in the sense that all vendors should have access to the same information. Procuring entities have to keep written documentation of the process, and the EU regulations imply that all competing vendors are allowed insight after the procuring entity has chosen its supplier. If a supplier is not selected, it is entitled to a detailed explanation of why its tender was rejected.

From 2016, the process will be regulated by a new directive (EU, 2014b), which allows essentially the same procedures, along with innovation partnership. This new procedure allows suppliers to develop works, supplies, or services not currently

available in the market through long-term partnerships with contracting authorities. Innovation partnership can be awarded after running a tender with negotiations. In addition, the new directive allows for "better use of public procurement in support of common societal goals" (EU, 2014a). These goals include environmental protection, social responsibility, innovation, combating climate change, employment, public health, and other social and environmental considerations (EU, 2014a).

We have limited knowledge of such issues with regard to when to choose different procurement procedures and the best way to carry out the procurement process. These questions are of special interest for competitive dialogue, which is a new instrument that has so far been less used than the other procedures.

2.3 Summary

The last two decades have seen a rise in the importance of procurement, as companies and the public sector have outsourced various activities to a greater degree. Parallel to this, the US government has raised the issue of increased professionalism among procurement personnel. The EU introduced new procurement regulations between 1988 and 1992, which were updated in 2004. These regulations specify fairly streamlined procedures, based on the underlying principle of an open and transparent process and equal opportunities across the EU/EEA.

However, as shown in section 2.1.2, research has shown mixed results with regard to corruption, and SMEs seem to face additional burdens in the procurement process. The procedures take time and are fairly bureaucratic—and, in some cases, the procedures may be inefficient. Some vendors have complained that these processes are too cumbersome, prompting them to decide not to take part in public sector tenders. A number of studies (see section 2.1.2) have indicated varying degrees of compliance across Europe. We might also expect different attempts at workarounds (e.g., breaking up procurements into smaller procurements to fit value limits or specifying the requirements to fit a preferred vendor).

Public procurement is, in itself, more complex than private procurement due to the potential contradiction between socioeconomic goals and the goal of fair and equal competition (Thai 2001). The detailed regulations make public procurement an even more complex task, and there is an inherent contradiction between following the rules

and regulations (which require open and transparent processes, in which all vendors get equal opportunities) and running an efficient process in terms of time and resources (e.g., man-hours). Finally, the public procurement of IS is even more complex than the public procurement of most other goods or services.

The contradictions relating to public procurement can be depicted as dialectics. These contradictions can exist between the goals of the different stakeholders. Chapter 3 offers an introduction to dialectics and a limited overview of some of the applications of dialectics in IS and e-Government research. This chapter will also show why dialectics is being applied as an analytical lens in this study. Finally this chapter provides an introduction to stakeholder theory and the applications of this theory in IS research.

3. Analytical lenses

My second research question focuses on conflicting goals in the public procurement of IS. During my data collection and analysis, I realized that dialectics could be applied as an analytical lens. Dialectical theory assumes that organizational entities exist in a pluralistic world of colliding events, forces, or contradictory values that compete for domination and control (Van de Ven & Poole, 1995). These contradictory values may be simultaneously part of a work culture, or they may be held by different stakeholder groups with opposing interests (Robey, Ross, & Boudreau, 2002); hence, I have also applied stakeholder theory as an analytical lens. The following subsections will introduce these two theories, before discussing how they can be combined (section 3.3).

3.1 Dialectics

Dialectics and dialectical thinking originate from ancient Greece, referring to a discourse between two or more people who hold different points of view about a subject, and who wish to establish the truth about the matter through reasoned arguments. To Socrates, questioning was the way to acquire knowledge. He posited that the questioning of authority was the sole source of answers (Meyer, 1980). In modern Western philosophy, the concept of dialectics is generally applied according to the Hegelian view. This concept is named after the German philosopher Georg Wilhelm Friedrich Hegel; however, he did not apply the term. For Hegel, all of history is dialectic, progressing towards the "liberal state" (Fukuyama, 2006). Karl Marx and Friedrich Engels appropriated the term further, using it to mean dialectical materialism, in which class struggle is the central contradiction, and the communist society is the end of history (Fukuyama, 2006). My analysis is based on the Hegelian view.

Contradictions consist of opposites (i.e., thesis and antithesis); however, these are not necessarily in conflict (according to Merriam-Webster's (2015) definition of conflict as a struggle for power or property or as a strong disagreement between people or groups). Dialectical thinking implies that contradictions are specifically sought (Mathiassen & Nielsen, 1989) in the form of a thesis and an antithesis. A thesis is composed of multiple assumptions. An antithesis contains assumptions that are opposite to one or more of the assumptions constituting the thesis, and it challenges

the existing order (Sabherwal & Newman, 2003). In dialectical theory, stability and change are explained by reference to the balance of power between opposing entities, change occurs when a thesis is replaced with an antithesis or a synthesis (Van de Ven & Poole, 1995).

The thesis and the antithesis both have to be reasonable explanations of the area of concern (the topic or the whole); they are logically opposites. A dialectical relationship is fundamentally a change process driven by a contradiction. In understanding the contradiction as a whole we can logically understand it as a thesis pulling in one direction and an antithesis pulling in the opposite direction. Out of this a synthesis can be created that brings us forward.

In dialectical terms the thesis can be so forceful that it destroys the antithesis (and vice versa) - if we manage in a particular way we choose one (the thesis) and neglect the other (the antithesis). We cannot understand the phenomenon without understanding the thesis and the antithesis.

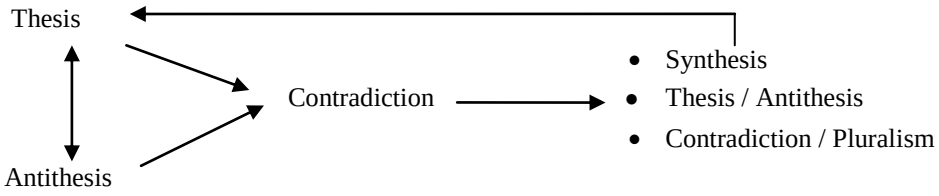

Figure 3.1: Dialectical process lens (adapted from (Van de Ven & Poole, 1995))

The dialectical process (Fig. 3.1) can result in three possible outcomes: (a) a synthesis, which reconciles the thesis and anti-thesis; (b) the prevailing of the thesis or the anti-thesis; or (c) no resolution, in which the thesis and the antithesis remain in a state of pluralism or contradiction. A synthesis may, in turn, become a thesis, setting off an antithesis and a new dialectical process. In Hegel's idealistic view, history can be viewed as a dialectical process that progresses from one state to another (and generally better) state.

3.2 Dialectics in IS research

A dialectical approach has been suggested for studying IS implementation, which is conceived as a complex, intertwined set of social and political interactions (Myers, 1995). Bjerknes (1991) applied dialectics in her analysis of the Florence project, in which the goal was to build systems to assist nurses in their daily work. She found several contradictions, one of which was between the scientists' work contract and their project commitments. Bjerknes (1991) also discovered a contradiction between the nurses involved in the project (who had an interest in the project) and the other nurses on the ward.

In an early paper, Markus (1983) showed how a new system could change the power structure in an organization and how this could lead to resistance. Howcroft and Light (2002) showed that in the selection of packaged software, relations may be just as problematic and conflictual in nature, leading to dialectics, as in systems development and implementation. However, the power in the acquisition of software packages lies with the people who have financial control, because these people may impose their own views or constraints on the design process, which could conflict with user needs.

Dialectical thinking has also influenced systems development methodologies. For example, the possibility of combining Soft Systems Methodology (SSM) and dialectical thinking has been explored (Mathiassen & Nielsen, 1989). The Scandinavian traditions of user participation and participatory design can be traced to dialectical thinking and the more political paradigm of conflict between workers and employers (Bjerknes & Bratteteig, 1995). Bjerknes and Bratteteig (1995) have questioned the role of trade unions as worker´s representatives, because workers may have differing interests depending on their contracts and skills. The authors also questioned whether user participation in change processes contributes to democracy, warning that a focus on one system tends to disconnect the design process from the larger organizational context in which power is enacted.

Dialectical reflections can be the means to understand the change processes that take place in IS development (Bjerknes, 1991; Markus, 1983). Sabherwal and Newman (2003) have applied dialectical theory to explain persistence and change in their process theory of IS development. Robey et al. (2002) have identified dialectics between old knowledge and new business processes and practices that ERP is designed to support. Dialectics were further applied to analyze misalignments between

structures embedded in ERPs and the structures of implementing organizations. Finally, Soh, Kien Sia, Fong Boh, and Tang (2003) found tensions between integration and differentiation and between process orientation and functional specialization.

Dialectics has also been applied as analytical lenses to understand contradictions in implementing enterprise content management (Nordheim & Päivärinta, 2006) and in enterprise systems implementation (Nordheim, 2011; Nordheim & Nielsen, 2008). These dialectics, or contradictory views and forces, may be inherent, since an organizational entity may have several conflicting goals. Contradictory forces may, however, also exist between different stakeholders with opposing interests, in line with Marx and Engels' thinking, or the work of Bjerknes (1991), and Bjerknes and Bratteteig (1995). More recently, and along the same lines, a combination of dialectics and stakeholder theory has been suggested (Flak, Nordheim, & Munkvold, 2008; Nordheim, Moseid-Vårhus, & Bærø, 2014). This leads to my next perspective.

3.3 Stakeholder theory

Stakeholder theory originates from Edward Freeman (1984), and addresses morals and values in managing an organization. A stakeholder can be defined as "any group or individual who can affect or is affected by the achievement of the organization's objectives" (Freeman, 1984). Some definitions, however, limit the term to people who have risked something in their relationship with a firm (Clarkson, 1995), or to those who have the power to change the strategic future of the organization (T. M. Jones & Wicks, 1999; Mitchell, Agle, & Wood, 1997).

Stakeholder theory is descriptive, instrumental, normative, and managerial (Donaldson & Preston, 1995). It describes a corporation (or public entity) as a constellation of cooperative and competitive interests, and is instrumental in establishing a framework for examining the connection between the practice of stakeholder management and various performance goals. Its normative nature implies that stakeholders are persons or groups with legitimate interests. In management literature, it has been posited that paying attention to stakeholder interests leads to competitive advantages for companies (T. M. Jones, 1995; T. M. Jones & Wicks, 1999). In my work, I have applied stakeholder theory as an analytical lens; hence, it is the descriptive aspect of stakeholder theory that is relevant here.

Stakeholders differ with respect to the size of their stake in the firm or public entity. According to Mitchell et al. (1997), stakeholders also differ in their power, legitimacy, and urgency. Mitchell et al. (1997) defined power as a relationship between social actors in which one actor, A, can get another social actor, B, to do something that B would otherwise not have done. Legitimacy is defined as a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions. Urgency is defined as the degree to which stakeholder claims call for immediate attention. Figure 3.2 shows the different classes of stakeholders, where the classification is based on whether a group possesses one, two, or all three attributes.

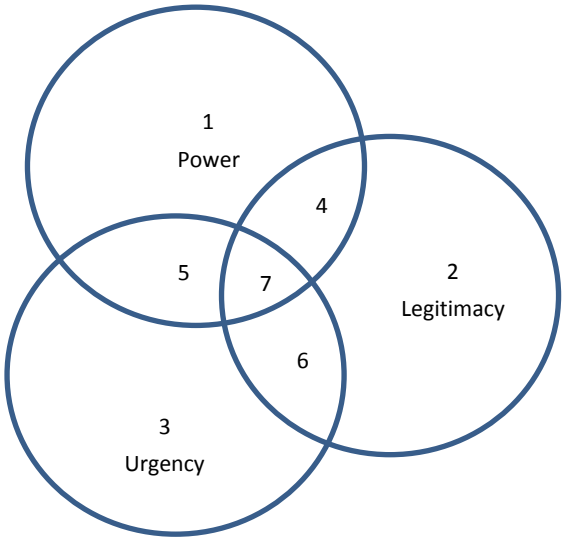

Figure 3.2: Qualitative classes of stakeholders (based on (Mitchell et al., 1997))

Some stakeholders may possess only one of the stakeholder attributes (classes 1, 2, and 3); these are termed as latent (or dormant), discretionary, and demanding. Other stakeholder groups may possess two (classes 4, 5, and 6) or all three attributes (class 7). Stakeholders who possess all three attributes are definitive: they need to be included in decision-making processes. Stakeholders who possess power and urgency but lack legitimacy (class 4 in figure 3.2) can be characterized as dangerous (Mitchell et al., 1997). Nordheim and Nielsen (2008) have shown the importance of assigning sufficient power to user representatives in enterprise systems implementations.

3.4 Stakeholder theory in information systems research

Stakeholder theory and the need to involve different stakeholders in IS development have been explored since the early days of IS research (Pouloudi, 1999; Ruohonen, 1991). Different stakeholders have potentially very different values and interests in relation to IS. These differences need to be resolved through political means, such as bargaining, compromises, truces, or even bribery (Lyytinen, 1988). In a similar vein, Mingers and Walsham (2010) raise the issue of developing and acquiring IS that are compatible with the needs of the users. Stakeholder theory has also been adopted in the e-Government field (Flak & Rose, 2005). Findings from a study on Danish transformational government shows differences in focus, such that, while managers and IT experts focus on technological and organizational issues (i.e., internal issues), elected representatives are most interested in e-inclusion and participation (i.e., external issues) (Reinwald & Kraemmergaard, 2012).

Stakeholders can be influential in the success or failures of public IS projects (Scholl, 2004; Sæbø, Flak, & Sein, 2011). Flak and Nordheim (2006) have found that contradictory stakeholder objectives can help explain the relatively slow development of e-Government in Norway. Since stakeholders have a significant role to play in ensuring successful e-Government, a shared understanding of the interests, perspectives, value dimensions, and benefits sought by the various stakeholders is vital (Rowley, 2011).

Since the procurement of IS may affect different stakeholder groups, we should expect the specification of requirements and the selection of vendors and systems to be critical to the stakeholders affected. This applies especially to the public sector, because organizations that are subject to political rather than economic controls are likely to face multiple sources of authority, which may conflict (Boyne, 2002). Since decisions made during a procurement process have long-lasting effects for different stakeholders, we should also expect issues to be time-sensitive. Stakeholder analysis has been applied to explain the abandonment of an IS procurement project (Pan, 2005).

The concepts of urgency and legitimacy in stakeholder theory (ST) have been instrumental in showing how a stakeholder group with limited power can be successful in achieving a synthesis in enterprise system implementation (Nordheim et al., 2014). Similarly, in my work, I have searched for inherent conflicts and conflicts between

stakeholders that are involved in procurement projects and those who are not, which are characterized by power and urgency (a group seen by Mitchell et al. (1997) as "dangerous"). The power held by each stakeholder may differ over time, and a project manager or a top manager may play a role in assigning that power. Legitimacy may be defined in different ways by the various stakeholders at the different levels of an organization (Mitchell et al., 1997).

3.5 Summary

This chapter has given an overview of the analytical lenses (i.e., dialectics and stakeholder theory) applied in the papers published as part of this research study. Dialectical thinking implies a specific search for contradictions: a thesis and an antithesis. It also implies that a synthesis is sought. The opposing entities may be internal, because an organizational entity may have several conflicting goals. An organizational entity may also face stakeholders who compete for priority. Dialectics may occur within a single person or an organization (Van de Ven & Poole, 1995, p. 521); however, it focuses on the interaction between an organizational entity or group and opposing entities or groups.

In this chapter, we have seen that dialectical reflection and contradictions can be means to understanding the change processes in IS development. Dialectical theory has also been used to explain persistence and changes in the process theory of IS development. Furthermore, dialectical thinking has been applied as an analytical lens to understand contradictions in IS implementation. Recently, a combination of dialectics and stakeholder theory has been suggested (Flak et al., 2008), which has led to my presentation of stakeholder theory and the application of this theory in IS and e-Government research. Stakeholder theory is both a normative and a descriptive theory; however, the focus here is on the descriptive aspect. Stakeholders differ with respect to the size of their stake, as well as their power, legitimacy, and urgency (Mitchell et al., 1997). Chapter 4 will explain the research approach that has guided my data collection.

4. Research approach

I employed three research approaches in my dissertation: a literature review, a Delphi study, and a series of three interpretive case studies. I began with a literature review, since this represents the foundation for research in IS (J. Webster & Watson, 2002) and served to set the scene for the next stage of my study.

The literature review identified a lack of research on challenges in the public procurement of IS, and this led to my research question 1. We can expect these challenges to be considerable, because of the added potential for complexity in policymaking and management (section 2.1.1), on the one hand, and rules and regulations on the other hand (section 2.1.2). Limitations also exist in terms of procedures (section 2.2). The challenges (RQ1) were examined through a Delphi study, which has previously been applied in ranking key issues or challenges within IS (Schmidt 1997). Section 4.2 presents the research design for this work.

The literature review further identified a lack of research on the actual public procurement process, as well as a scarcity of systematic studies that cover software package procurement (Pollock & Williams, 2007). This led to my research questions 2 and 3. Furthermore, as Heiskanen, Newman, and Similä (2000) pointed out, in-depth and longitudinal studies have been scarce, and this scarcity still remains. Thus in-depth qualitative case studies are needed. Section 4.3 explains the research design for this work.

4.1 Literature review

I conducted a systematic literature review using previously proposed guidelines (Kitchenham, 2004; Kitchenham et al., 2009; Okoli & Schabram, 2009), and by adopting the process for literature reviews described by J. Webster and Watson (2002). Section 4.1 gives details on the design of the review. My literature review focused on the "procurement of information systems in the public sector", with public organizational entities as the unit of analysis. J. Webster and Watson (2002) recommended a structured approach to research, beginning with leading journals and moving both backward and forward to identify the relevant literature. The authors further recommend the adoption of a concept-centric approach when creating a literature review, and included guidelines for both structuring and writing a review.

However, J. Webster and Watson (2002) did not include recommendations on the actual screening of previous research identified in the literature search. Okoli and Schabram (2009) developed an eight-step guide for a systematic literature review tailored to IS research, which I found useful. Some of these steps seem obvious, such as being clear about the purpose and conducting a systematic search that includes both top journals in the field and electronic sources. However, Okoli and Schabram (2009) pointed out that several high-quality reviews from prestigious journals (e.g., Information Systems Research (ISR), Journal of Management Information Systems (JMIS), Journal of the Association of Information Systems (JAIS) , and Management Information Systems Quarterly (MISQ) have not been explicit in their criteria for practical screening and quality appraisal.

I conducted a systematic search of selected journals, referring to top journals in both the fields of IS (i.e. MIS Quarterly, ISR, EJIS) and e-Government (i.e. Government Information Quarterly*)*. I also selected less prestigious journals because they covered topic areas as in e-Government (i.e. Electronic Journal of e-Government and Journal of Public Procurement) in issues published between 1992 and 2014. In addition, I did a backward search based on the selected papers. I browsed both library search engines and Google Scholar using a set of keywords (the key terms "public" and "government", and "acquisition", "procurement" and "purchasing" were used in combination with information systems and ICT). Few papers have been published specifically on the subject of "government procurement of IS" or "public procurement of IS". Hence, my literature search included public and government procurement in general. However, specific challenges in public IS procurement may not be covered by this research; thus, I also searched for general work on IS procurement.

All referred journal papers on the public procurement of IS and on government procurement of IS were included. In addition, four conference papers were included. Three of these were included because of their specific relevance (Moe & Päivärinta, 2011; Moe, Risvand, & Sein, 2006; Schiessl & Duda, 2007), whilst the fourth was included because of its relevance and quality (Howcroft & Light, 2002). One book (Ford, 2002) and one book chapter (Rosemann, 2003) were also included as they were particularly relevant. Papers focusing on the public procurement of specific goods (military materials, etc.) were included only in rare cases, where the focus of the paper was the public procurement process. After excluding papers based on quality criteria and relevance, and after carefully reading all abstracts, a total of 138 references

remained. The majority of journal papers in my data are from non-IS journals, which emphasizes the lack of research from within the IS community. Specifically, of the journal papers included, only 15 were published in IS journals, and 7 were published in journals on computer science or computer engineering.

I used Thai's (2001) model of the "procurement system in action" (figure 1.2) to organize my findings. Table 4.1 (table 1 in paper 1) summarizes my findings in four main categories. The first three categories are based on Thai's conceptual model, whilst the fourth comprises papers that are more general in nature. I categorized my findings based on a careful reading of all abstracts. Papers covering the private sector were included in this overview when they covered IS procurement or when they served the purpose of exploring the actual process.

Table 4.1: Development of publication numbers for different topic areas (from paper 1)

Factors		**< 2000**	**2000-2012**	**Total**
Policy making and management		4	25	29 (21%)
Procurement regulations		10	4	14 (10%)
Procurement function in operations	*Technology for procurement (e-procurement)*	1	26	27
	Organizing procurement	6	19*	25*
	The procurement process	0	24*	24*
	Sum of papers on procurement functions in operations	7	62	69 (50%)
General		6	20	26 (19%)
Number of papers across topic areas		27	111	138 (100%)
Note: * I classified 12 papers in the organizing procurement subcategory, 17 papers in the procurement process subcategory, and seven papers in both subcategories in the period from 2000 to 2012.				

Since the year 2000, there has been a significant increase in publications in the "big box" of Thai's (2001) conceptual model, which is called the "procurement function in operations" (box 4).

4.2 Delphi study

Since we know little about the key challenges in the public procurement of IS, I conducted a Delphi study (the study was done in collaboration with a second researcher; however I did the main part of the data collection. Hence, I have used the term "I" to denote the work I did alone, and the term "we" to denote what was done collaboratively).

The Delphi method is useful in complex, immature fields that require expert judgment (Gupta & Clarke, 1996; Rowe & Wright, 1999). The method originated in the early 1950s at the Rand Corporation as a forecasting technique (Gupta & Clarke, 1996). However, the method has since evolved, and differing forms are in existence, such as the "modified Delphi" (McKenna, 1994), the "policy Delphi" (Crisp, Pelletier, Duffield, Adams, & Nagy, 1997), and the "real-time" Delphi (Gordon & Pease, 2006). The Delphi technique has numerous applications in diverse fields, such as health sciences (Holey, Feeley, Dixon, & Whittaker, 2007; Keeney, Hasson, & McKenna, 2006), tourism research (Donohoe & Needham, 2009), and IS research (Iden, Tessem, & Päivärinta, 2011; Schmidt et al., 2001).

The Delphi method fits especially well in situations in which experts are geographically scattered (Gupta & Clarke, 1996; Rowe & Wright, 1999). The method formalizes communications between researchers and experts in order to extract unbiased information based on experts' opinions. The key features that characterize the Delphi method are anonymity, multiple iterations, controlled feedback, and the statistical aggregation of a group's response (Rowe & Wright, 1999). However, in practice, there are seldom more than two or three iterations (Rowe & Wright, 1999). Potential disadvantages include the need for a lengthy process, potential researcher influence over responses based on the formulation of the questions, and difficulties resulting from the fact that the experts never meet in person (Murry & Hammons, 1995).

I chose to follow the process steps recommended for ranking-type Delphi studies (Okoli & Pawlowski, 2004; Schmidt, 1997) in order to identify, select, and rank the observed problems and challenges. Schmidt (1997) applied and provided a detailed description of "ranking-type" Delphi studies, which are used to develop group consensuses regarding the relative importance of issues.

4.2.1 Composition of the expert panels

The most important aspect of the Delphi method is the choice of appropriate experts (Okoli & Pawlowski, 2004). I invited practitioners from different types of reasonably sized public entities in Norway (e.g., municipalities, government-run entities, and entities in central government). I also selected experts from vendors that provide systems and services to the public sector and that control a considerable portion of this market. I decided not to invite experts that serve in other roles (e.g., as consultants, advisors, and lecturers/academics). I considered involving end-users as an additional panel; however, after some searching, I realized that these stakeholders are generally less experienced in the actual procurement processes, since they have only been involved in procurement in their domains.

In line with Okoli and Pawlowski (2004), I utilized a rigorous procedure for selecting the experts. I required the experts to have a minimum of three years' experience in their current position or a similar position with procurement responsibility (or, in the case of vendors, sales). I also required experience from a minimum of three IS procurement processes or services in the public sector. I contacted the experts, whom I knew from previous projects or through professional networks, by both e-mail and phone, inviting them to participate and explaining the purpose and process of our research. While doing this, I interviewed them on their expertise to ensure that they fulfilled our criteria. I further asked them to nominate other experts who satisfied our selection criteria. I also contacted the largest municipalities in Norway, because I expected them to have experts on the procurement of IS among their procurement personnel.

I grouped the experts into panels, as suggested by Okoli and Pawlowski (2004), because one of our goals was to obtain a reasonable degree of consensus. I formed one panel for vendors´ sales managers, one for CIOs, and one for procurement managers in public entities. This approach allowed us to compare the perspectives of different stakeholder groups. Our design involved three expert panels: procurement managers, chief information officers (CIOs) and representatives of vendors.

4.2.2 Data collection and analysis

We divided the data collection process into three phases: brainstorming, narrowing-down, and ranking, as recommended by Schmidt (1997) and Okoli and Pawlowski (2004). I used e-mail in all the interactions with experts in these phases, because e-

mail is a rapid medium that allows dialogue to take place, along with the clarification of unclear issues. However, it also guarantees anonymity between the participants as they only see indirectly what others have responded, and not the e-mails.

Brainstorming

In the first phase, we brainstormed issues relating to research question 1. I sent a welcome letter to the participants by e-mail. Each expert was asked to list at least six challenges or dilemmas related to public IS procurement; however, I encouraged them to submit as many as possible, as suggested by Schmidt (1997). Moreover, I asked them to give each challenge a name and a definition. I also asked them to give the causes for each challenge, as well as the consequences that would occur if the challenges were not managed. In answering these questions, the experts gave a structured explanation of each challenge. The experts were all e-mailed a form, but they were also told that they could reply in free-text. Some replied with very detailed information. While the form structured the replies, it also forced the panelists to consider their own local theories in relation to the issues; thus, we received a lot of data relating to challenges in public IS procurement. Asking experts to justify their reasoning is an optional feature of Delphi studies; however, it can be a valuable aid for understanding the causal relationships between factors—an understanding that is necessary to build theory (Okoli & Pawlowski, 2004).

For example, one challenge identified in public IS procurement was to write clear requirements specifications. One CIO explained that this was necessary because of the strict requirements for tender format and the low threshold for official complaints. This could lead to vendors taking advantage of shortcomings in specifications, as well as to procuring entities making the wrong choices. One of the procurement managers explained that this challenge was caused by a lack of a holistic understanding of the business processes, which could lead to numerous change orders and to the procurement of modules that are not implemented. Table 4.2 shows a sample form from another panelist, also concerning requirements specifications. The table shows two identified challenges of public sector IS procurement, their reasons/causes, and their consequences. These lists can be analyzed further, and in a separate paper, we suggest an enhanced Delphi method that integrates data analysis techniques from Grounded Theory (Päivärinta, Pekkola, & Moe, 2011).

Table 4.2: An example of a data collection sheet for the brainstorming phase

(Informant name, role, & contact information: e-mail: xxx@yyy)			
#	**Reason(s)**	**Challenge / Issue**	**Consequence(s)**
1	IT procurers are not professional	Writing good and detailed requirements specifications.	Thin and low-quality bids [from the vendors]
2	System users may have problems defining their needs. It is difficult to find an appropriate level of detail. Many years may go between subsequent projects in one domain, before new systems are bought.	Buying software. It is difficult to define needs.	Municipal governance is very inter-twined and many-sided organization, which delivers a wide spectrum of services. This is, in turn, reflected in IT applications. A typical municipality can have 70 to 90 different business applications. This creates a challenge in acquiring and ensuring necessary integrations between the applications. The same data are often registered and stored in many places because the systems do not communicate with each other.
3	…	…	…
4	…	…	…
5	…	…	…
6	…	…	…

The experts e-mailed their lists to us directly, thus remaining anonymous to each other. After collecting the replies, we combined the issues into a single list, removed exact duplicates, and unified the terminology. We collated the responses independently before comparing and consolidating the individually constructed lists. I sent our consolidated list of 96 challenges back to the experts to ensure that we had not misinterpreted any issues or eliminated any challenges in this phase. This step resulted in the addition of two more items.

Narrowing down the results

In the second phase, we narrowed down the list to a manageable number of the most important issues. In each panel, each expert defined around 20 issues that he/she considered the most important. The presentation order of the full list of issues was

randomized to avoid bias in the selection of the most important challenges based on the sequence of factors in the list.

This phase resulted in a list of 19 issues, which were selected as follows. First, we selected a "top 10" list based on the total number of votes across the three panels. This resulted in 13 challenges in total (because the challenges ranked from 10 to 13 received the same numbers of votes). Then, we checked whether there were large differences between the panels' selections. Values for Kendall's tau (a measure to study ranking correlations between different panels) showed some correlations between the panels' selections for the narrowed-down lists. However, all of the correlations had values of less than 0.5 (see table 2 in paper 2), which is a sign of two rankings not being relatively similar. Thus, we decided to include challenges chosen by more than 50% (Schmidt, 1997) of members in each panel, to ensure that each panel's challenges were represented in the narrowed-down list. This resulted in the inclusion of six additional challenges for further analysis, giving a total of 19 challenges in the list.

Ranking

In the third phase, the top 19 issues were ranked by relative importance. Since τ for all pairs of panels were below 0.5, we chose to do the ranking separately for all three panels. By dividing the experts into three separate panels, we expected to reveal potential differences in challenges between these three stakeholder groups. The third phase was carried out in two rounds. In Delphi studies, the number of ranking rounds depends on whether each panel reaches either an acceptable level of consensus or a state at which the level of consensus stagnates. A Kendall's coefficient of concordance (W) was used to measure the level of consensus within each of the panels.

The results from the first round of ranking were fed back to the panel members. The members were asked to reflect on their rankings compared with the panel's average and then to re-rank the challenges. Kendall's tau values for the first ranking round showed some interesting results. While the top issues from the narrowing-down phase correlated between all panels to some extent, the disparity between the vendor panel and the two other panels increased after the ranking rounds. The vendors' selections did not correlate significantly with those of the two other groups. The procurers' and CIOs' rankings continued to correlate; however, some factors were valued very

differently by the two panels. Hence, a panel-wise discussion and comparison of the ranking results is legitimate.

Schmidt (1997) recommended a concordance level of $W = 0.7$ to indicate high levels of agreement among the respondents in each panel. Ideally, the ranking rounds should continue until either a concordance level of $W = 0.7$ is reached, or the concordance level does not increase between two consecutive ranking rounds; however, it should stop when one more round is no longer considered feasible, even if the concordance level continues to increase and has not reached 0.7 (Schmidt, 1997). We decided to stop ranking after two rounds, because of several indications that the panel members were not willing to participate in more rounds. I had to send several reminders on the second round, and we lost one vendor. We expected to lose more panel members if we continued after two rounds, and further dropouts would have weakened the reliability of yet another ranking. We had gained a moderate consensus ($W > 0.5$) in two of the panels (procurement managers and vendors), but the CIO group consensus was weak to moderate ($W > 0.39$) (Schmidt, 1997).

4.3 Interpretive case studies

Once the key challenges and dilemmas in the public procurement of IS were identified, I needed to study them in more depth to answer research questions 2 and 3. To reveal the process, it was necessary to carry out in-depth interpretive longitudinal studies.

A multiple case study approach was used. I collected data from three different public procurement projects in two different municipalities in Norway. Norway is a Scandinavian country with approximately five million inhabitants. Altogether, the country has 429 municipalities of widely varying sizes; the largest has more than 600,000 inhabitants, whereas there are 25 with fewer than 1,000 inhabitants. However, the municipalities have a great deal of autonomy and, as part of this, they are responsible for procuring and maintaining a number of IS for such tasks as accounting, payments, health services, education, building applications, and engineering infrastructure. Norway is not a member of the EU; however, through being part of the EEA, it is obliged to follow the EU's regulations on a number of issues, including public procurement.

I followed the projects over a period of time, from just after the announcement of the tender (open tendering) or of upcoming tendering (the other procedures) to implementation and completion. The research was interpretive, and was in line with criteria put forward by Klein and Myers (1999), with no predefined independent or dependent variables, formal propositions, or hypothesis testing. Rather, I have tried to produce an understanding of the context of the public procurement of IS, as well as of the process whereby public procurement influences and is influenced by context. This does not mean that I did not have any guiding theory, because my data collection has been guided by stakeholder theory. However, I have been open to other findings. For example, observations of meetings gave me insight into large parts of the procurement process, and, in interviews, I tried to give respondents the opportunity to tell their stories. It was through this process that I realized that dialectics could be applied as an analytical lens. Walsham (1995, 2006) recommended using theory as an initial guide and as part of an iterative process of data collection.

4.3.1 Introducing the cases

I deliberately selected three cases that differed in terms of important issues, as seen in table 4.3. This allowed me to collect data from cases with different outcomes and to gain a deeper understanding of the procurement process. Yin (2009) suggested the selection of cases that predict contrasting results for anticipatable reasons. In my case, two of the three cases were selected after seeing them on the national portal in Norway for public tenders, and the third case was identified through "snowballing" a short time after the tender was announced on this portal.

The cases were all from different procuring entities. In case 1, the procuring entity was the claims department of one of the 10 largest municipalities in Norway. In case 2, the procuring entity was the health and care service department in a medium-sized municipality. In case 3, the procuring entity was the IT department of the same municipality studied in case 1. The organization of the projects also differed with regard to certain aspects. The procurement project in case 1 was led by a manager of the procuring unit, and the project group included a member of the procurement department. In case 2, the project manager was an advisor in the health department, and the project group consulted with the shared procuring entity. In case 3, the project group was led by the second-in-charge in the IT department, and the project group only had members from this department. Table 4.3 gives a brief overview of the cases; further details are given below and in paper 5.

Table 4.3: A brief overview of the cases

#	Type of system	Procuring entity	Type of procedure	Project period	Resource use *		Cost of system
					Procuring entity	Per vendor	
1	Claims system	Claims department, municipality A	Open tendering	Feb. 2012 - May 2013**	300 man-hours	50-100 man-hours	1.0 MM NOK (€117,000)
2	Electronic health record system	Health department, municipality B	Tendering with negotiations	Jan. 2012 – Feb. 2013 **	4,500 man-hours	175-250 man-hours	2.4 MM NOK (€280,000)
3	System for backup and archiving	IT department, municipality A	Competitive dialogue	Feb. 2012 – Jan. 2013	540 man-hours	150-200 man-hours	1.9 MM NOK (€221,500)

* The estimated use of resources is prior to implementation

** The project groups were formally dissolved; however, some informal project organization remained. In case 1, due to integration problems, the implementation was not finished until well into 2014

The system in case 1 would collect claims from citizens who had not paid invoices for such items as public housing, childcare, and real estate tax. The municipality's legacy system had existed for more than 10 years and was owned by the claims department. In 2012, the vendor of the old claims system decided to bundle claims with its ERP system. Subsequently, the vendor terminated contracts with all users of the claims system that did not use their ERP system. The municipality did not use this ERP system; hence, the claims department was obliged to procure a new claims system. The project group ran an open tender with specified exclusion criteria.

The procuring entity in case 2 had been using an Electronic Health Record (EHR) system from a local vendor for 15 years when the procurement project started. New government regulations were initiated in 2010, mandating message exchanges among municipalities, local general practitioners (GPs), and public hospitals. All municipalities were given three years to comply. The legacy system had been developed by a one-man company, and the municipality had enjoyed a special service as the company's largest customer. However, the vendor of the legacy system was unable to upgrade it to meet new government regulations, and, in February 2012, the

municipality established a subproject to procure a new EHR system. The project group ran a tender with negotiations.

The procurement in case 3 was concerned with a back-end system for backup and archiving. This system was designed for the IT department in the same municipality studied in case 1. Hence, the users were IT staff, and the project group was comprised entirely of IT employees. The need for a new backup system arose from a rapidly growing amount of data. The team members feared that, because of this, IT services would not be able to run full backups with the old system during weekends. There was also an anticipated need for an archiving system. The project group was not certain of the project needs before starting the process; thus, it chose to use the competitive dialogue procedure.

4.3.2 Data collection

In all three cases, I was able to attend internal meetings and meetings with some of the vendors taking part in the tendering process. I attended a total of 25 meetings for a total duration of 70 hours. In all three cases, I attended both internal project group meetings and meetings with vendors. Notes were taken, and the meetings were digitally audio recorded. I also wrote reflection notes after the meetings. However, a full transcription of the meetings was not possible, because the recording was not of sufficient quality. I was careful not to interrupt—and, thus, was unable to place the microphone optimally for all participants. I did have an opportunity to sit in on meetings with project groups when the vendors had left, and the project groups discussed the vendors' solutions and performance. However, I was careful not to interfere and did not give my opinions on any of the vendors. Hence, I assumed more of the role of an outside researcher than of an involved researcher (Walsham, 1995, 2006).

In addition, I was able to carry out interviews with the project leaders, user representatives and vendors in all three cases. In two of the cases, I interviewed procurement personnel involved in the projects (in the third case, the project group did not involve the procuring entity in the municipality). Nearly all the interviews were carried out after the meetings had been held. In all three cases, I performed an extra interview of the project manager a year after installation to get the full story of the implementation. In total, I conducted 32 interviews. Eleven of the interviews were done over Skype. The other interviews took place at the subjects' premises—and,

except for one small incident, the interviews were all uninterrupted (see paper 5 for an overview of the interviews). I made it a point in all interviews and all meetings to ask for permission before audio recording, as well as to guarantee the participant's anonymity. All interviews except one were transcribed. I also wrote reflection notes after the interviews. All interviewees received a copy of the transcript and were told that, if they wanted to correct or delete parts, I would do so. This was done in two instances, one of which concerned an internal conflict.

I attempted to apply best practices in conducting the qualitative interviews (Myers & Newman, 2007). For example, I was able to enter the three public organizations at a high level through personal contacts. This high level of entry meant that I had access to staff and vendors at various levels of the organizations. All interviews were largely unscripted, with just a few key questions used to guide the subject in the opening stages. One of the guidelines I found particularly effective was the use of mirroring in question and answers (Myers & Newman, 2007, p. 7). This approach allowed me to focus on the subjects' world and language, rather than imposing my own world and language. For example, if a subject said, "we experienced some major issues in our negotiations with the vendors," I might use the words of this sentence as a mirror to probe further: "Tell me more about the issues you experienced in your negotiations with the vendors." This approach could then be extended to move or "drill down" from the general subject to specific events that exemplified the issues mentioned.

There are many potential problems and pitfalls in qualitative interviews. Klein and Myers (1999, p. 4-5) mentioned a number of these, such as: artificiality of the interview, lack of trust, lack of time, level of entry, elite bias, ambiguity of language, and the Hawthorne effect. Conducting the observation prior to the interviews helped me avoid some of these. I had met nearly all of the subjects before the interviews; thus, there was much less situational artificiality than might have been the case. The exception to this was that I did not meet one of the vendors beforehand; I interviewed him in his own house, because he worked from home. I believe that having met the vendors before the interviews also helped to generate trust. A lack of time, however, was an issue in one of the interviews with the project manager in case 2; to be more precise, I believe that I may have taken too much of her time, as I continued the interview longer than I should have. Level of entry was not a problem, because I entered all of the cases at a high level of entry (two through personal contacts), and

focused on the people directly involved in the process. Moreover, no significant problems were experienced in the interviews.

I was also granted access to internal documents in all three cases, as well as to e-mails to vendors in one of these cases. In one of the cases, I was also granted access to letters regarding the exclusion of one vendor, as well as letters to the Norwegian complaints body, from both the excluded vendor and the procuring entity. An overview of this material is shown in table 4.4.

Table 4.4: Overview of internal documents from the three cases

#	**Material**
Case 1	12 internal e-mails and 4 e-mails with notes from reference checks. Minutes from four meetings. Letter notifying one vendor of its exclusion, as well as the corresponding complaint letter from this vendor to the procuring entity. Official complaint to the Norwegian Complaints Board for Public Procurement (KOFA) from the excluded vendor. The corresponding letter from the public entity to KOFA explaining the reason for the exclusion. The final requirements specification.
Case 2	Plan of the procurement and of the change project. Minutes from the first negotiation meeting.
Case 3	Letter from the lawyer stating that competitive dialogue could be applied. Memos from two internal meetings. Instructions to vendors for the dialogue meetings. Question concerning the procedure from one vendor, the answer to which was sent to all vendors. Final requirements specification. Offers from all vendors. E-mail sent to all vendors, with a redacted offer from winning vendor. Rankings of all offered solutions and procurement protocols.

In the following, I will give an overview of the procurement process in each of the cases, as well as a more detailed overview of the data collection.

Case 1

The first case was conducted in one of the 10 largest municipalities in Norway, a city with close to 100,000 inhabitants. I gained access to this case by contacting the IT manager in the municipality. This was shortly after the project group had announced the call for tender over the national tender portal (DOFFIN), and the project manager was somewhat reluctant to grant me access. This was her first procurement project. My first interaction was a short informal talk with the project manager. This gave me the opportunity to gain an overview of the process, and I took notes from the meeting. I was also given minutes from the three meetings the project group had had prior to my involvement.

The full process is shown in figure 4.1. The procuring entity ran an open tender, with specified criteria for exclusion based on social criteria and vulnerability. The project group borrowed requirements specifications from two other municipalities and tailored them to their needs before announcing the call for tender. Two vendors filed documentation and submitted their offers by the deadline. One of the vendors was excluded due to vulnerability. The procuring entity was afraid that accident or illness would make updating the system impossible, as the vendor only had two employees (a man and his wife). Hence, there was only one vendor left in the competition. The project group invited this vendor to demonstrate its solution before selecting the offer and signing a contract in October 2012. The procuring entity wanted to fit the installation in with other ongoing projects; thus, implementation was planned for six months later, in May 2013.

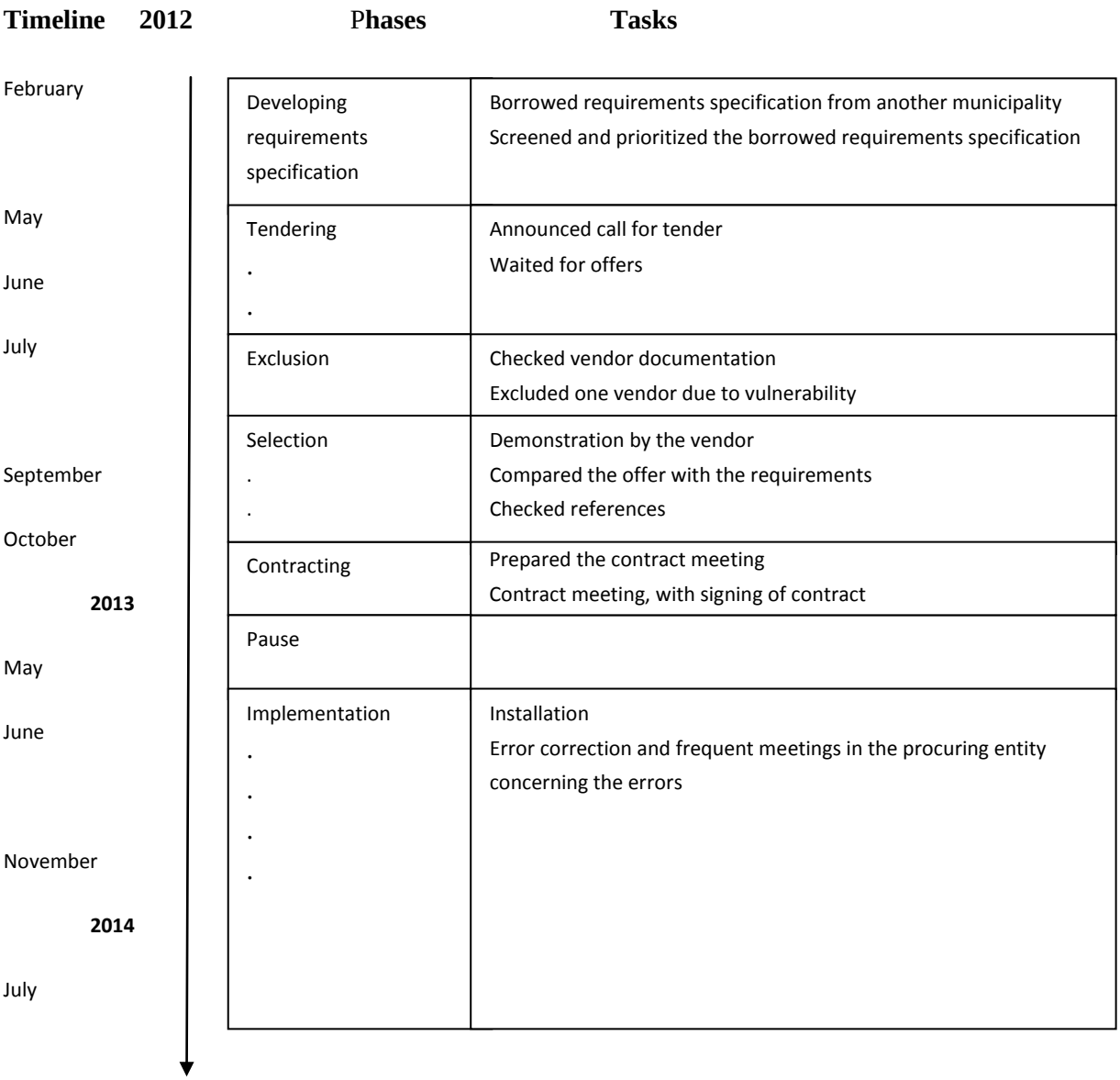

Figure 4.1: Timeline of the procurement process for the claims system

My first data collection took place as an observer during the first meeting, after the project leader and the procurement manager had opened the formal offers. After this, I participated in two meetings with the entire project group. There were two meetings in which I did not participate (I received the minutes from one of them). In addition, I did not participate in a demonstration run by the vendor that later signed a contract with the procuring entity group. Table 4.5 gives an overview of the meetings I attended.

Table 4.5: Overview of the meetings attended in case 1.

Date	**Agenda, task, findings**	**Participants**	**Length**
03.07.12	Walkthrough of the two offers, decision to disqualify one vendor due to vulnerability	The project leader, the procurement manager, the super user of the claims system and of the ERP system, the IT manager and the labor union representative	4h. 30 min.
05.07.12	Confirmation of the exclusion of one vendor Structured walkthrough of the only remaining offer and determination that the "have-to" requirements were met Planned demonstration and checking with other public entities regarding their experiences with the vendor	The project leader, the procurement manager, the super user of the claims system and of the ERP system, the IT manager and the labor union representative	5h. 0 min.
24.09.12	Structured walkthrough of the only remaining offer (after having seen a demo of the system in a previous meeting), as well as confirmation that the "have-to" requirements were met.	The project leader, the procurement manager, the super user of the claims system and of the ERP system, and the IT manager (the labor union representative did not participate)	1h. 30 min.
12.10.12	Concluded that a contract meeting could be scheduled	The project leader, the procurement manager, the super user of the claims system and of the ERP system, the IT manager, and the labor union representative	2h. 33 min.
19.10.12	Meeting to prepare the contract meeting	The project leader and the procurement manager	2h. 11 min.
22.10.12	Contract meeting with the vendor	The project leader, the procurement manager, and the winning vendor	5h. 0 min.

I began interviewing the day after the contract had been signed, in late October 2013. As I was following three cases at the same time, it took some time to complete the interviews. Implementation was planned for May 1, 2014. Over the following six months, I interviewed the project manager twice, the super user of the claims system twice, and both the winning vendor and the vendor that was disqualified. Ultimately, the procuring entity struggled with implementation, as the integration with the ERP system had major flaws. These meant that the users had to double-check the output from the new claims system for the first six months of use. The integration problems prompted me to carry out a final round of interviews a year later. During this round, I interviewed the procurement manager, the super user of the ERP system, and the project manager.

Case 2

The second case was conducted in a slightly smaller municipality in Norway, with nearly 50,000 inhabitants. This municipality is part of a network of seven adjoining municipalities that cooperate on procurement. In this case, one of the other municipalities decided to join the procurement project. I became aware of this procurement case after seeing the call for tender on the Norwegian tendering portal, DOFFIN, in early April 2012. I got in touch with the tender's contact person and after explaining my interest and my project, received permission to follow the project.

The procurement entity ran a tender with negotiations. Figure 4.2 gives an overview of the process. As part of the process, the project group had an open announcement asking all interested vendors to submit documentation for prequalification. Prior to this, the project group had borrowed requirements specifications from a neighboring municipality of approximately the same size, which they tailored to their needs. The tailoring was based on input from a full-day brainstorming workshop with a group of user representatives. It was also based on visits to three other municipalities that had applied systems from the three main vendors of EHR-systems. All three vendors filed the necessary documentation for prequalification in early May. They were all found to qualify, and submitted their offers in early July. The procuring entity ran negotiations with all three in August/September before selecting a winner. The winning vendor took care of the conversion of some of the old data and ran training as part of the implementation during the period from November 2012 to January 2013. The new system went live on February 1, 2013.

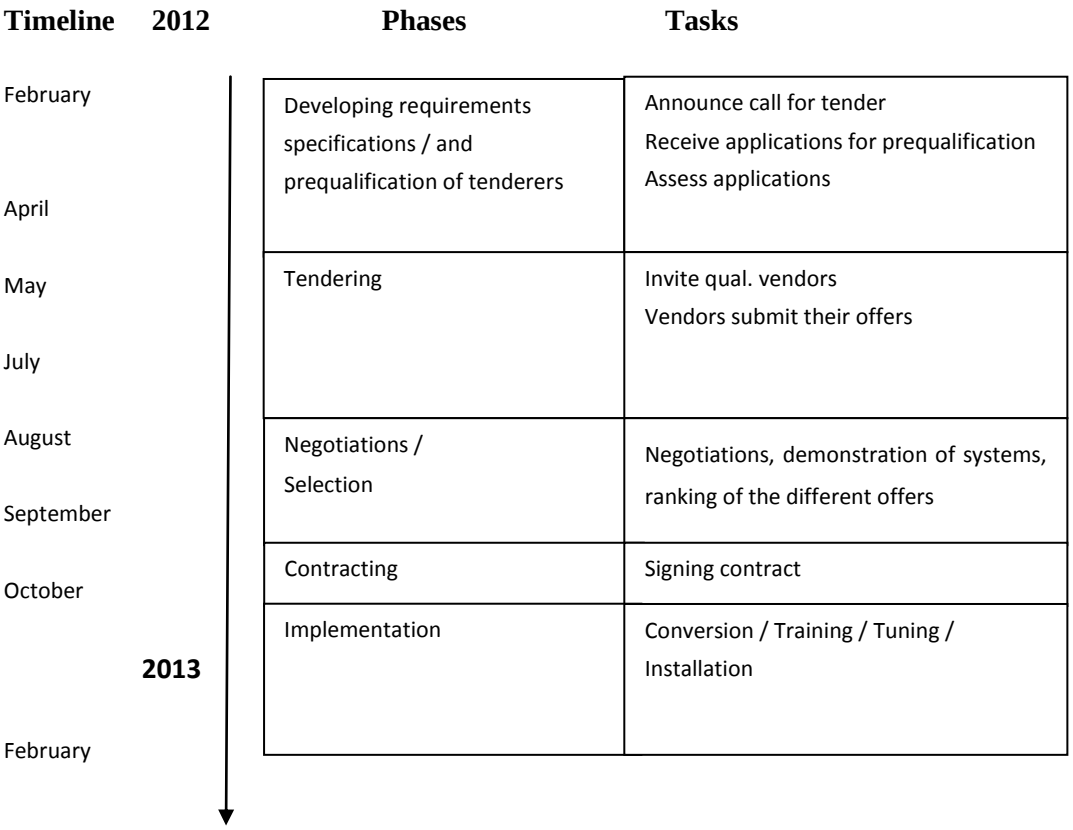

Figure 4.2: Timeline of the procurement process for the electronic health record system

My first data collection took place as an observer at a meeting on May 10, 2012, when the project group opened the documents from the three vendors who had qualified. This meeting was led by a procurement consultant. He sat with the documents from all three vendors, while the whole project group sat around him. He read through all three sets of documents, checking issue by issue to determine whether the vendors met all the criteria specified in the invitation. This process could have been completed by one person alone; however the consultant took the opportunity to explain the process to the group.

The next meeting I attended occurred the following week. Again, the meeting was led by the procurement consultant. This time the project group discussed and finalized the requirements specifications, preparing to send them to the three vendors taking part. The vendors were given a deadline in early July to submit their offers. The offers were opened in a meeting in which only the project manager and the procurement consultant took part. The project group did not meet again until after they had all returned from their holidays, in early August. I took part in this meeting. Two weeks later, the project group had a two-day "workshop," during which they went through all the offers to get to "know them [the offers]" properly and to prepare the negotiation meetings. I did not take part in this workshop.

Following this workshop, the project group ran a series of three full-day meetings with each of the three vendors, for a total of nine meetings. I took part in three of these nine meetings: one meeting in the first round, one in the second, and one in the final round, during which the vendors were asked to run demonstrations of their systems on two pre-assigned cases. One of the meetings I took part in was with the vendor that became the winning vendor, and the two other meetings were with one of the other vendors. Furthermore, I received a copy of the minutes from one of the meetings I missed. Finally, I took part in the meeting on September 20, 2012, during which the project group conducted the formal ranking of the three offers and decided which two tenderers to engage with in a further round of negotiations. The final negotiation took place through two one hour-long telephone meetings, one with each vendor. I did not take part in these conversations.

Table 4.6: Overview of the meetings attended in case 2.

Date	**Agenda, task, findings**	**Participants**	**Length**
10.05.12	Went through the pre-qualification material from the three vendors.	Only the internal part of the project group and the procurement consultant	3h. 0 min.
16.05.12	Final work on the requirements specification and formal invitations to the three vendors to participate and submit offers.	Only the internal part of the project group and the procurement consultant	3h. 25 min.
09.08.12	Project group meeting, quick walkthrough of the offers, scheduling of the negotiation meetings, and sending of the schedule to the vendors. Issues: Training, the other municipality's role	The whole project group, including the "other" municipality and the procurement consultant	3h. 0 min.
30.08.12	First negotiation with vendor 2	Three representatives from the vendor, as well as the whole project group, including the "other" municipality and the procurement consultant	7h. 0 min.
07.09.12	Second negotiation meeting with vendor 3, concerning contract terms (terminated after one hour, as the vendor had suggested terms that the procuring entity was not ready to accept) Informal project group meeting after the vendor left to discuss further tactics	Two from the vendor, as well as the whole project group, including the "other" municipality and the procurement consultant.	2h. 30 min.
13.09.12	Demo, vendor 2	Two representatives from the vendor, the whole project group (except the project leader), project group members from the "other" municipality, and the whole reference group of 16.	7h. 0 min.
20.09.12	Evaluation and ranking of the offers, final round of telephone negotiations with two of the three vendors.	The whole project group, as well as two representatives from the "other" municipality	7h. 0 min.

I completed the first two interviews with the project leader and the leader of the overall change project just a week prior to the final meeting in which I took part. These were short interviews over Skype to provide an overview of the actual process. I used these interviews to "snowball", in other words, I used them to identify and select four interviewees from the reference group. These interviews were carried out over Skype two to three weeks later. I carried out three more interviews over Skype in November before completing five face-to-face interviews the day before and the week after going live with the new system. The interviewees included the project leader, the overall change project leader, one of the project group members from "the other municipality", the winning vendor, and the two procurement consultants involved. I returned a year and a half later to interview the super user of the new system and the manager of the overall change project.

Case 3

The third case was conducted in the same municipality as the first case. I became aware of this procurement after seeing the call for tender on the Norwegian tendering portal, DOFFIN, in early April 2012. I contacted the IT manager, whom I knew well, and was immediately granted access to follow the case. The procurement was announced as a competitive dialogue. I was allowed to follow all meetings that fitted into my schedule, and I received memos from most of the meetings I missed. The timeline of the process is shown in figure 4.3. For further details, see paper 5.

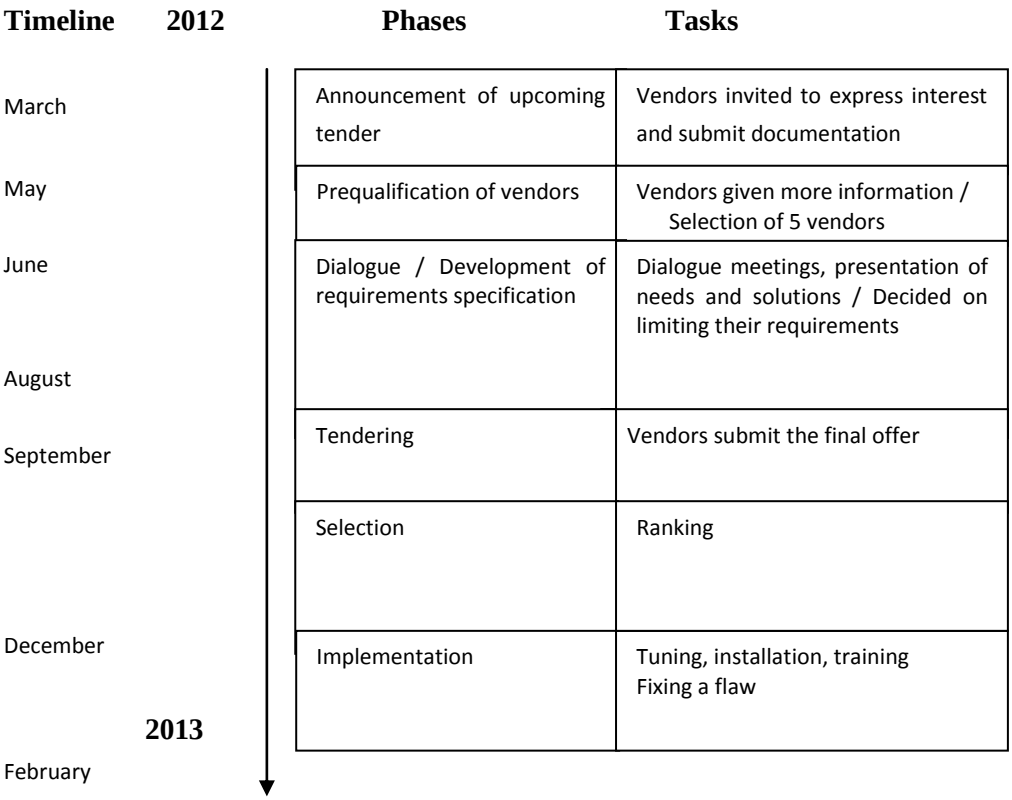

Figure 4.3: Timeline of the procurement process for the system for backup and archiving

Prior to my involvement, the project group held three project group meetings, during which it prepared the announcement for the tendering portal. I have minutes from all of these meetings. Furthermore, the project group received a statement from its legal expert, who stated that applying the procedure of competitive dialogue was in line with regulations. The tender was announced in April. I took part in a meeting in early May, during which the project group examined the documentation from the vendors that wished to be selected for the dialogue. During this meeting the project group decided to run a dialogue with five vendors, representing seven offers altogether. I also took part in the next meeting, during which the project group planned the first round of dialogue meetings. I also took part in the first dialogue meeting, which involved three of the vendors. The week after, I took part in a short meeting in which the project group planned the next round of dialogue meetings. I also took part in the second round of dialogue meetings with two of the vendors. The project group decided not to run a third round of dialogues Two weeks later it finalized its requirements specifications in a meeting, in which I took part. Subsequently, the project group did not organize any significant activities for two months because it was the holiday period. During this time, the vendors had to finalize their offers.

After the holiday period, the project group held one meeting to sum up and plan the further process, as well as three meetings to evaluate the offers (between August 20 and September 11, 2012). I took part in three of these four meetings. Finally in January 2013, after the implementation, the project group held a "debriefing" meeting with the vendor it had selected. I also took part in this meeting.

Table 4.7: Overview of the meetings attended in case 3.

Date	**Agenda, task, findings**	**Participants**	**Length**
03.05.12	Project group meeting—opening and evaluation of the applications for prequalification	The whole project group and the legal expert.	1h. 30 min.
22.05.12	Project group meeting—planning of presentation and first round of dialogue meetings	The whole project group and the legal expert.	2h. 19 min.
30.05.12	Dialogue meetings with three vendors	The whole project group. The legal expert was available, if needed. - Five representatives from the vendor in the first meeting - Eight from the vendor in the second meeting - Five from the vendor in the third meeting	 2h. 0 min. 2h. 0 min. 2h. 0 min.
08.06.12	Project group meeting—status on updated solutions	The whole project group.	1h. 0 min.
12.06.12	Dialogue meetings with two vendors	The whole project group. The legal expert was available, if needed. - Three from the vendor in the first meeting - Two from the vendor in the second meeting	 2h. 0 min. 2h. 0 min.
25.06.12	Project group meeting—finalizing the requirements specification and evaluation criteria	The whole project group.	2h. 0 min.
20.08.12	Project group meeting—summing up the process so far	The whole project group.	2h. 0 min.

04.09.12	Project group meeting—evaluation of the suggested solutions	The whole project group.	3h. 30 min.
11.09.12	Project group meeting—evaluation of the suggested solutions	The whole project group.	2h. 30 min.
24.01.13	Evaluation meeting with the vendor	The project manager and the sales representative from the winning vendor.	1h. 30 min.

In this case, I began by interviewing the legal expert on September 2012. This interview took place on the day before the final meeting to evaluate the offers, because the legal expert was about to quit his job at the municipality and join a law firm. Following this, I interviewed the project manager twice and also interviewed two of the project participants over the next two months (October and November). After this, I interviewed the winning vendor and one of the losing vendors. Finally, I interviewed the project manager a year and a half later, in October 2014.

4.3.3 Data analysis and validation of findings

All interviewees were given feedback. They were also allowed to read the transcripts and correct or delete parts they felt were incorrect or which they did not want to disclose. In two of the cases, I also gave a seminar to disseminate some of the findings. In the third case, I sent the project leader one paper based on the findings. All of the interviewees were asked if I could follow up the case if I needed to clarify the data, and all except one confirmed (the exception was hesitant because he was changing jobs). In this study, I followed the traditions of interpretive research.

> …(the) interpretive approach does not predefine independent and dependent variables but is aimed at understanding the context of process change and how process change influences and is influenced by the context. This can facilitate the construction of rich knowledge in the area by focusing on the full complexity of human sense making as a process change situation emerges. (Grover & Kettinger, 2000 p. 172)

My analysis is based on the textual material gathered in my empirical work and detailed above. The many interviews I undertook were my primary data source, as were my observations from some of the meetings in which I took part at each of the

three case study sites. The transcripts from the interviews and the meetings were not coded. However, the transcripts and reflection notes made it possible to develop interpretations, to abstract, and to draw plausible conclusions. For each interpretation and conclusion, I re-read the interviews, systematically searching for quotes that both confirmed and disconfirmed my interpretation.

Through this process, I was able to interpret the responses and construct credible descriptions of the process of IS procurement in each of the cases. I did not attempt to force the evidence into a single story line; rather, I maintained several stories, including dissenting voices. I have carefully selected several verbatim quotes in the findings to give the reader an insight into the three procurement processes.

One example that illustrates this process concerns the exclusion of one vendor in case 1. In this case, I was able to triangulate different types of material. I took part in the procuring entity's meeting in which the project group decided to exclude the vendor, on the grounds of the vendor's vulnerability and the risk that the software might not be updated in the future. The vendor was a firm that consisted of two employees: a man and his wife. In this meeting, participants mentioned the possibility of "the couple having a car accident, and, due to this, [going] out of business." I then used the opportunity to ask the procurement manager and the project leader about this incident during the interviews. In analyzing these two interviews, I searched for all comments regarding this vendor. I also interviewed the excluded vendor, and I gained access to letters regarding the exclusion. This made it possible to double-check my interpretations concerning conflicting goals: *Select the best system, irrespective of future risks,* vs. *avoid selecting a vendor that cannot maintain or update the system*.

I made similar findings in case 2, in which the project group in the procuring entity met twice to debate whether or not to exclude one vendor. In the first meeting, the project group decided to send the vendor in question home from a negotiation meeting, because of unacceptable contract terms. I was an observer in both of the meetings in which the project group debated this issue. I was also an observer in the negotiation meeting. In later interviews, I questioned both the procurement consultant and the project leader on this issue, asking whether they had considered excluding either of the two other vendors. I was later able to go back and re-read the interviews. In this case, however, I was not able to interview the vendor, and there is less written documentation, because there was no exclusion and no official complaint. In this case, I arrived at an

interpretation of two conflicting goals: *Select the best system, irrespective of future risks,* vs. *avoid selecting a vendor with unacceptable contract terms.*

According to Gibbons (1987), the interpretations should attempt to recover the original meanings of the stories, as seen from the subjects' various perspectives. In my case, this was done through the process of providing feedback to the interviewees and allowing them to comment on the transcripts, without revealing my findings. Thus, the final transcripts represented the interviewees' stories. In this context, Gibbons (1987) suggested that attempts should be made to uncover the important issues that underlie the stories—issues of which the subjects may not even be aware. The informal network of procurement experts may fall into this category (see paper 5). Finally, Gibbons (1987) suggests trying to discover meanings in other arenas beyond the original one (i.e., procuring software in the public sector). Here, we could seek to apply the findings in the private sector or in other countries.

In my study, I employed processual analyses, using five guiding assumptions (Pettigrew, 1997) proposed: 1) embeddedness, which involves studying the processes at several levels of analysis; 2) temporal connectedness; 3) the role of explanation in context and action; 4) the search for holistic rather than linear explanations of process; and 5) the need to link process analysis with location and the explanation of outcome.

I applied embeddedness by observing in meetings in all three project groups, and in meetings with vendors in two of the cases. I also interviewed project members from the procurement entities and vendors in all three cases, and interviewed user representatives in the reference group in one of the cases. Through the application of embeddedness, I found that the procedures applied were shaped partly by the regulations, but also by the inner contexts of the procuring entities. Further data collection from the vendor side could probably show how processes on the vendor side are interconnected with the processes applied by the procuring entities.

I further attempted to reveal the temporal interconnectedness by following the process in all three cases over time, from when the projects were announced (in two of the cases, slightly afterwards in the third), until more than six months after the installation. In my interviews, I tried to trace the history of the project, including the history of the system that was being replaced. History is crucial, according to Pettigrew (1997). Examples of history's crucial role include conflicts and contradictions in case 2 (see

paper 4). In that case, there were contradictions between change and persistence. The project leader had the goal of implementing a message exchange, while the strong super user of the old system wanted to keep that system for longer. This super user justified his resistance to change by citing the introduction of a national core health record and accompanying new requirements that he expected would result in a need for yet another procurement. A further example of an instance in which history played a role was the decision of the IT services group, which was the procuring entity in case 3, to use the competitive dialogue procedure rather than procurement personnel. This decision relates to the group's prior experiences with different procedures, as well as their experiences of prior cooperation with procurement personnel in previous projects.

In order to see how context and action are intertwined, I included issues concerning context in the notes from all meetings in which I participated. Issues included and recorded were: who participated, how the meetings were run and if any extraordinary things occurred. The role of explanation for context and action is illustrated by how the project group managed the reference group in case 1. Here, the project group invited the reference group to the vendor demonstration, but, at the same time, they ran the meeting in an authoritarian manner, with no opportunities for questions outside the schedule.

The search for holistic rather than linear explanations of process requires data collections over a longer period—possibly years—as well as across different procurement projects. This task is beyond the scope of this dissertation. However, such an exploration could possibly help to explain the choice of procedure and the decision to not use procurement personnel in case 3.

I ensured the possibility of linking the analysis of the process to any outcomes by applying a processual approach with a longitudinal period of data collection. In addition, I attempted complexity reduction by limiting the number of cases (to three), and having a clear outcome variable: the final implementation of the systems procured. Since my research questions included the issue of conflicting goals, there was a risk that not all project participants in the three cases would disclose their full stories. Thus, I applied observations in meetings, in addition to carrying out interviews. According to Yin (2009), no single source has a complete advantage over others; instead, the

various sources are complementary. Thus, I interviewed different stakeholders, because different stakeholders may have very different or even conflicting goals.

I further adopted the guidelines for interpretive field studies proposed by Klein and Myers (1999), including the principle of the hermeneutic circle (see table 4.8). In the papers, I included "thick" descriptions, to a large degree (as far as page limitations allowed). The need for "thick descriptions" is important in trying to understand what is happening (Walsham, 1995). The thick descriptions in this paper are in the form of verbatim quotations, translated from Norwegian. I have also included verbatim quotes in chapter 6 in the research summary, both in the presentation of the papers and in the discussion of the results.

Table 4.8: Application of the principles of interpretive field studies (Klein and Myers 1999)

No	Principle	Application to my study
1	The Fundamental Principle of the Hermeneutic Circle	The findings in my dissertation and three of my papers (papers 3 through 5) are the results of iterative analysis. In completing such an analysis, I have tried to understand the contexts of the project groups, the histories of the legacy systems and their relations to some of the vendors, and the procurement process. A hermeneutic process was carried out when writing papers 3 through 5.
2	The Principle of Contextualization	The historical and social context of the procurement process was described in detail, including thick descriptions.
3	The Principle of Interaction between the Researcher and the Subjects	Interactions with various informants during the interviews—and, especially, participation in project meetings and meetings with vendors—revealed socially constructed meanings of the collected data. Recurrent interviews with project leaders in all three cases enhanced my understanding of the phenomenon under study.
4	The Principle of Abstraction and Generalization	Based on my contextual and theoretical understanding of the phenomenon, I was able to develop my understanding of dialectics and stakeholder theory, as well as to compare the data and the theories to draw plausible conclusions.
5	The Principle of Dialogical Reasoning	The initial data collection was guided by my limited understanding of stakeholder theory and dialectics. During the process of data collection, my understanding of the theoretical concepts increased, and a new interpretation of the data emerged. This guided my final round of data collection.
6	The Principle of Multiple Interpretations	To some extent, the participants offered differing and partly conflicting stories and interpretations, especially in case 2 (however, this occurred less frequently than expected in the other two cases). Based on triangulations of different interviews and of issues I observed in several of the meetings, I attempted to establish the most plausible interpretation for each case.
7	The Principle of Suspicion	To minimize possible biases and systematic distortions in the collected data, I interviewed as many of the project group participants as possible. I also interviewed one winning vendor, one losing vendor and one disqualified vendor.

In terms of disseminating my findings, all of the participants in the Delphi study received a short paper with the main findings of this study in the form of an executive summary. Furthermore, I gave a seminar on the public procurement of IS to two of the procuring entities after 12 of a total of 16 interviews had been carried out in these two entities. Finally, I sent one of the papers to the third entity after completing 14 of 16 interviews in this entity.

4.4 Summary

This chapter has presented an overview of the research approaches for the literature review, the Delphi study, and the interpretive case studies. For the literature review, the chapter covered the sources for the search, the selection criteria, and the choice of Thai's (2001) conceptual model of public procurement in action as a means of organizing the findings. Furthermore, the chapter discussed the reason for choosing to apply a Delphi study, and it covered the composition of the three expert panels, data collection through brainstorming challenges in the public procurement of IS, and the narrowing down and rankings of the challenges.

The key aspect of this chapter, however, is its presentation of a research approach for the interpretive case studies. This section introduced the cases and elaborated on the data collection. This section also covered the data analysis. Section 4.3.3 shows how I arrived the findings from the cases.

5. Findings

This chapter summarizes the five research papers and their roles in providing answers to the research questions. It also includes findings from cases 1 and 3 that are not included in the papers. The list of the papers is given in table 5.1, and the full papers are included in appendix A.

Table 5.1: Overview of papers

#	Title	Authors	Publication	Year	Research method	Main finding
1	Research on Public Procurement of Information Systems: The Need for a Process Approach	Moe, C.E.	*Communications of the Association for Information Systems, 34*(1), Article 78	2014	Lit. review	Identifies key themes in public procurement research and sets the scene for the PhD by identifying a content gap (the procurement process) and a methodology gap (longitudinal case studies).
2	Challenges in Information Systems Procurement in the Public Sector.	Moe, C.E. and Päivärinta, T.	*Electronic Journal of e-Government, 11(1), pp. 307-322*	2013	Delphi study	Identifies and ranks the key challenges in public IS procurement, and hence serves to focus the further studies. Further, it identifies differences between different stakeholders.
3	The Public Procurement of IS - A Process View.	Moe C.E. and Newman, M.	*Proceedings of Hawaii Int. Conference on System Sciences, pp. 2158-2167*	2014	Interpretive longitudinal case study, case 2	Identifies conflicts between different stakeholders and the need for management of stakeholder issues.
4	Dialectics and Contradictions in Public Procurement of Information Systems	Moe C.E. and Sein, M.K.	*Electronic Government (IFIP 8.5 conference), pp. 289-300, Berlin Heidelberg: Springer*.	2014	Interpretive longitudinal case study, case 2	Identifies four dialectical contradictions and their possible synthesis.

5	The Public Procurement of Software: Dialectics in Requirement Specification	Moe, C.E., Sein, M.K. and Newman, M.	Under review with *European Journal of IS*	2015	Interpretive longitudinal case study, case 1, 2 and 3	Examines the main dialectic in detail and identifies two syntheses: choosing an appropriate procedure and learning through networks of public entities. Proposes a prescriptive framework.

The papers were ordered in sequence to show how they fit together and to present a coherent story, irrespective of publication date.

5.1 Paper 1 – Empirical foundation

Summary: This paper is a literature review that focuses on research on the public procurement of IS prior to 2012. The paper also covers research specifically on the process of public procurement and on the private procurement of IS. From a review of 138 papers, the study finds that most publications can be categorized into five themes: policymaking and management, procurement regulations, technology for procurement (e-procurement), the organization of procurement, and the procurement process. In addition, there is a collection of papers that do not fit these themes. These papers cover issues like the procurement concept, outsourcing, or special arrangements (e.g., public-private partnerships).

Findings: This paper provides an updated picture of themes in research on public procurement of IS and on the public procurement in general. Furthermore, the paper proposes research on the actual process of IS procurement as a key research direction, as well as a number of research questions for each phase of the process. The paper identifies the lack of in-depth longitudinal research and proposes a processual research approach.

5.2 Paper 2 – Identifying challenges: A Delphi study

Summary: This paper identifies and ranks challenges in the public procurement of IS through a Delphi study. The study involves three panels of experts: public procurement managers, CIOs in the public sector, and vendors. The experts identified

a number of challenges and ranked them in two consecutive rounds. All communication with the experts took place through e-mail.

Findings: The main findings of this paper are twofold. First, the paper shows that there are significant differences among the three stakeholder groups with regard to their views of the challenges. These differences relate to the stakeholders´ roles in the process, and the vendors ranking of specific challenges quite differently from the CIOs and procurement managers. The second finding resulted in an overview of the challenges and their relative levels of importance. Challenges relating to the requirements specifications are among the most important challenges, according to the panels; however, the vendor´s opinion can differ significantly from those of the CIOs and procurement managers on these issues. Some of the challenges relate to possible stakeholder conflicts.

5.3 Paper 3 — A process view

Summary: This paper introduces the three case studies. It describes the interpretive longitudinal research approach which was applied. The paper gives a detailed analysis of case 2 – the procurement of an EHR-system, where tendering with negotiations was applied. It gives a process view of the case, and it applies stakeholder theory in the analysis. It maps the critical incidents on a timeline, and shows a number of critical incidents in case 2.

Findings: The paper presents three main findings based on the analysis of case 2. First, it shows the need for stakeholder management to sort out possible conflicts between different stakeholders during the process of procurement (e.g., between two municipalities, between the super user of the old system and the project leader(s), and between the needs of the procuring entity and the vendor regarding contract issues). The second finding relates to the challenges inherent in the process concerning the requirements specifications and the need for dialogue with the vendors. The third finding concerns the critical incidents, a number of which related to actual stakeholder conflicts. These incidents relate to uncertainty concerning decision rules between stakeholders when two municipalities run a joint procurement project. They also relate to a conflict between two stakeholder groups on whether to convert data from the legacy system and migrate these data to the new system and whether to disqualify a vendor for not meeting the contract terms. The conflict related to the conversion of

data from the old system was resolved through the application of external expertise, as advice from the vendor.

5.4 Paper 4—Identifying contradictions and dialectics

Summary: This paper introduces the issue of contradictory goals in public procurement. It provides a brief introduction to stakeholder theory and dialectics and maps the most important stakeholders involved in the public procurement of IS. The paper also examines in detail the procurement process carried out by a public entity in case 2 – the procurement of an EHR-system. Dialectics and stakeholder theory are applied as interpreting lenses in analyzing the data.

Findings: The paper identifies eight goals, some of which are clearly conflicting. Upon dialectical reflection, these conflicting goals were shown to be instances of deep contradictions. In all contradictions, the paper identifies the resolution in the project. In two of the cases—"change vs. persistence" and "implementation primarily as a technical installation vs. implementation as a socio-technical change"—the thesis won. In the other two contradictions—"follow regulations vs. satisfy system needs" and "revolutionary change vs. incremental change"—resolutions occurred in the form of syntheses. However, in case 2, the procuring entity needed help from the vendor to sort out the contradiction on revolutionary vs. incremental change between two internal stakeholders.

5.5 Paper 5 — On the dialectics of requirements specification

Summary: This paper applies dialectics and examines in detail one of the contradictions (no. 1) identified in paper 4. The paper examines the various strategies employed by the three procuring entities to deal with this dialectic through an analysis of the three longitudinal case studies, all of them represent a synthesis for the dialectic.

Findings: The paper finds that the dialectic which is analyzed is the most important of the dialectics found in paper 4, and terms it the dialectics of requirements specification. This dialectic consists of the thesis of "abiding by the principles of the EU regulations on public procurement" vs. the antithesis of "obtaining the system that best meets a public entity's complex information requirement." The paper further finds that some of the tendering procedures for public procurement are possible syntheses

for the dialectics. Learning through networks from other public entities is another possible synthesis. Furthermore, the paper suggests a prescriptive framework to guide practice on which synthesis to select, which is based on the uniqueness of the system and the complexity of the requirements. The framework indicates the extent to which learning from other public entities and dialogues with vendors can be helpful, as well as which procedure should be selected. The paper also indicates that new challenges may arise from the different strategies; however, these challenges remain to be researched.

5.6 Unpublished findings

Since papers 3 and 4 were based primarily on data from case 2, I further analyzed the data from cases 1 and 3. Through this analysis, I found three more conflicting goals; a dialectical analysis showed that these represented one additional contradiction. Table 5.2 shows the additional goals identified in the cases, whereas table 5.3 shows the revealed contradiction. (The goals and the first four contradictions are given in paper 4).

Table 5.2: Goals observed in the unpublished analysis on the cases

Goal	Description	Evidence	Associated stakeholders
9	Select the vendor with the best system, irrespective of future risks	One vendor was left in the process due to the possibility that its solution might have been the best in case 2.	Project group
10	Avoid selecting a vendor that cannot maintain or update the system	One vendor was excluded due to vulnerability in case 1.	Project group
11	Avoid selecting a vendor with unacceptable contract terms	One of the vendors was nearly disqualified because its contract terms were not found acceptable in case 2.	Project group

Table 5.3: Overview and classification of the additional contradiction

Contradiction	Stakeholder related?	Conflicting goals
Current preference vs. future risk	No. Related to conflicting goals within the project.	Select the best system, irrespective of future risks, vs. avoid selecting a vendor that carries future risks.

5.7 Contribution of the papers to the research process

Table 5.4 summarizes how the five papers contribute to the process of carrying out the interpretive case studies. Paper 1 serves the purpose of identifying the phenomenon for the research (i.e., the process of the public procurement of IS). Paper 2 narrows down the phenomenon by identifying the actual problems faced by practitioners. Papers 3 through to 5 describe the cases and how the fieldwork was carried out, as well as the data analyzed. Specifically, paper 3 shows the processual approach and proposes stakeholder theory as a sensemaking device. Dialectics as sensemaking devices are applied in papers 4 and 5. These two papers also capture the theoretical contributions of the cases by abstracting and theorizing their findings.

Table 5.4: Overview of the process of the interpretive study (based on Walsham, 1995)

Purpose, stages in interpretive studies	Paper no.
Identifying the phenomenon to be studied, identifying theory to be applied to design the data collection	1
Identifying the actual problems within this subject area	2
Carrying out the field work (i.e., data collection and further identification of the phenomenon)	3, 4 and 5
Sensemaking (i.e., data analysis, construction of explanations)	4 and 5
Abstracting and theorizing	4 and 5

5.8 Contributions of the papers to the overall story of the dissertation

Taken together, these five papers form the basis of the overall story conveyed by my dissertation. The relationships among the papers are depicted in figure 5.1.

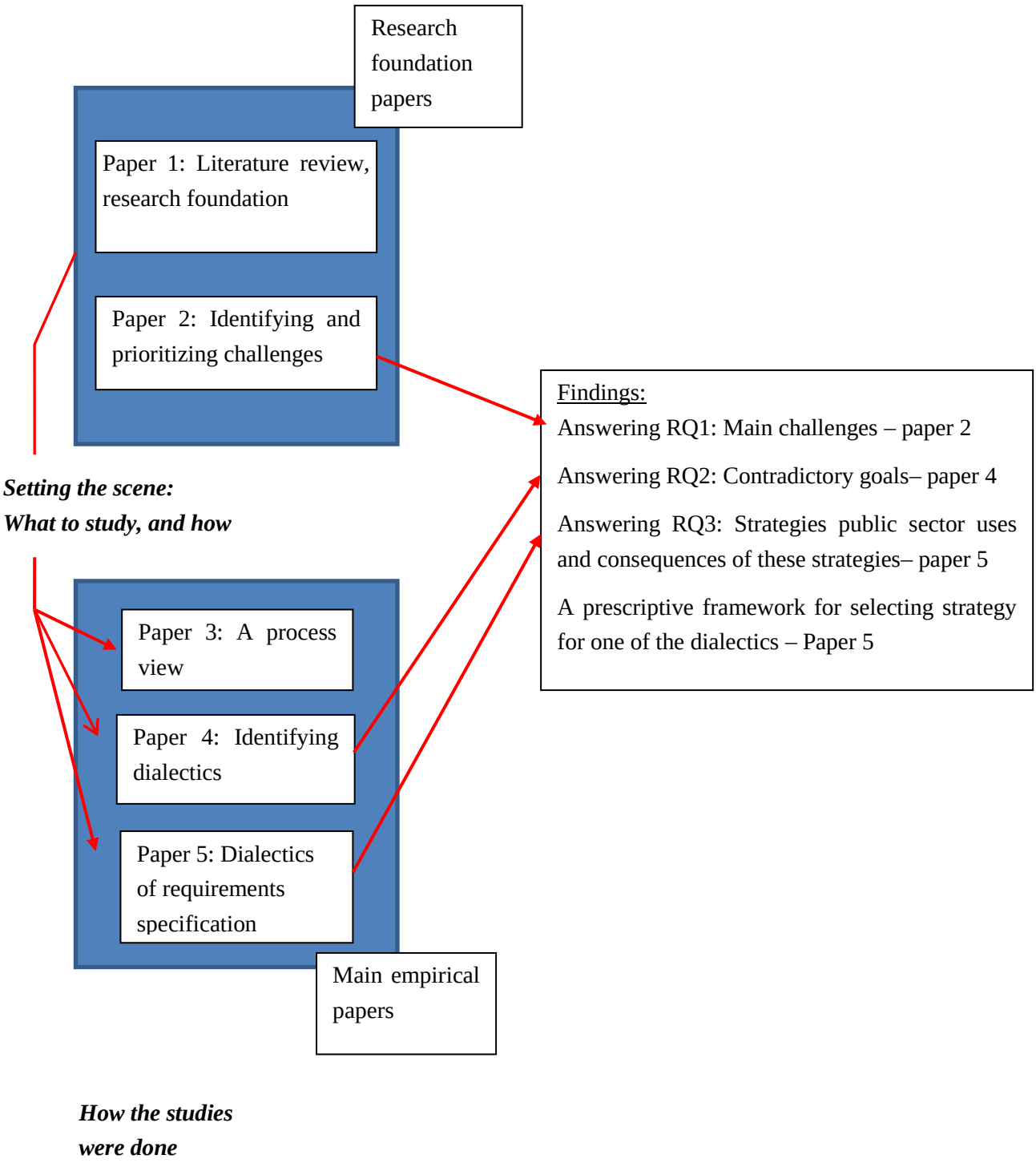

Figure 5.1: The relationships among the individual papers.

The first two papers serve as foundations for the study by setting the scene. The contributions made by these two papers are presented in table 5.5.

Table 5.5: Contributions of the research foundation papers to the dissertation

Paper no.	Contributions
1.	This paper identifies key issues in the research literature on public procurement in general and in IS procurement in particular. The paper identifies two gaps in the literature: a content gap, in terms of a lack of research (specifically procurement process), and a method gap, in terms of a lack of longitudinal interpretive research.
2.	This paper identifies and ranks key challenges in the procurement of IS in the public sector—and, hence, the issues that experts consider to be most relevant. Some of the key challenges are related to requirements specifications, and some are related to stakeholder issues.

Paper 2 also serves as an empirical paper and identifies key challenges, and this provides answer to RQ 1. Together with papers 3 through 5, which are based on empirical data from three case studies, paper 2 contributes to the outcome part of the dissertation. The contributions made by these four papers are presented in table 5.6.

Table 5.6: Contributions of the empirical papers to the dissertation

Paper no.	Contributions
2	By identifying key challenges, this paper shows significant differences among the views of different stakeholders. These differing views can be explained by the roles of the stakeholders. The paper identifies requirements specification as the main challenge of IS procurement.
3	This paper explains in detail how studies 3 through 5 were carried out. The paper gives a process view of the public procurement of IS and identifies stakeholder issues that could have led to severe conflicts in one of the cases. One of these stakeholder issues was resolved through the application of external expertise and one was not resolved in this case.
4	This paper identifies eight goals, some of which are clearly conflicting. Upon dialectic reflection, these goals were revealed to be instances of deep contradictions. Furthermore, the paper identifies corresponding resolutions. Some of these resolutions are related to different stakeholders.
5	This paper studies one of these contradictions in depth through a cross-case analysis, and it identifies different syntheses or strategies employed in the different cases. The paper also suggests a prescriptive model for possible strategies and it shows how the proposed strategies will lead to new dialectics, with theses and anti-theses.

6. Discussion

This dissertation highlights the complexity of the public procurement of IS. By following three procurement cases over a two-year period, I addressed the call for a process approach, as well as the need for longitudinal case studies. I set out to answer three research questions; thus, before presenting and discussing the overall contributions of the dissertation, I will first describe how I addressed these questions.

6.1 Answering the research questions

6.1.1 Challenges in public procurement

The first research question was:

RQ1. What challenges are faced by public entities when procuring IS?

This question was answered through the Delphi study reported in paper 2, which included key stakeholders in the public procurement of IS (e.g., procurement managers, CIOs, and vendors). What stood out as the most serious challenge for IS procurement was the process of requirements specification, for which there are two reasons. First, the challenges related to this issue are ranked highly, and second, the stakeholders differed significantly with regard to their views on the challenges that arise in developing requirements specifications.

Internal stakeholders (e.g., procurement managers and CIOs/IT managers in public procuring entities) ranked the creation of clear requirements specification as the most challenging issue in IS procurement. The production of comprehensive requirements specifications was ranked as one of the most serious challenges. The reason for such rankings is that, if a procuring entity discovers needs that should have been included in the requirements in the first place, it cannot take these into account when selecting from the various offers. Even worse, if a procuring entity discovers during the procurement process that it needs an additional module for the system it has selected, it is not allowed to include this in the procurement; instead, it must run an additional tendering process (case 2 shows an example of this).

Contrary to this, vendors in the Delphi study ranked feasible requirements as the second most serious challenge (see paper 2). The vendor experts argued that there was

a tendency for public entities to be so concerned with including everything that may be needed in the requirements specifications that they ended up including items and features that they would never use.

The vendors further pointed out that they were not able to show what they termed as their "capabilities" in public procurement processes. This challenge was ranked as number three in the list of challenges. Capabilities may include features of the software and the strengths of the vendor:, for example, it may offer a good follow-up customer service. These features may be useful; they may even be of great value to the procuring entity. However, the focus is entirely on what is requested in the requirements specifications. An open dialogue is one possible solution, because such a procedure allows vendors to highlight their capabilities before the requirements specifications are determined.

Based on these somewhat contradictory findings, I suggest the following proposition:

> *In the public procurement of IS, the procuring entity will attempt to include all possible needs in the requirements specification to avoid the risk of overlooking the right system due to the non-inclusion of certain needs, and the risk of having to run a second tender to cover any additional needs. Vendors wish to highlight their capabilities and to have the opportunity for dialogue; hence, they do not want requirements specification to be too detailed or to include more features than the procuring entity will possibly use.*

Another interesting challenge is that partnership and innovation are hindered. The procurement of IS may be well suited to public-private partnerships (PPPs) because of their complexity and the inability to develop detailed specifications (Lawther & Martin, 2005). Partnerships represent one solution to the challenge of requirements specifications, because vendors may have more specialized knowledge of state-of-the-art-technology, and will often have experience gained from implementing their systems in other procuring entities. A vendor may also know the procuring entity well through a partnership, and through this knowledge, may be able to advise the entity on its requirements. However, partnership can carry some disadvantages, and are not necessarily the best way of gaining access to vendors' experience. An alternative solution to a formal partnership is a non-committal dialogue between a procuring entity and one or more vendors; however, there are restrictions on dialogues between

procuring entities and vendors, which are related to the challenge of requirements specifications.

6.1.2 Conflicting goals

The second research question was:

RQ2. What conflicting goals are faced by public entities when procuring IS?

In sum, I identified five sets of conflicting goals among the three cases. These goals are shown in table 6.1. Two of the conflicting goals are related to stakeholders with conflicting views and interests, whereas the other three are conflicting goals within the procurement project.

Table 6.1: Conflicting goals identified in the dissertation:

No	Conflicting goals	Stakeholder related?
1	Conduct a formally correct procedure or select the system that best meets the project needs	No. Related to conflicting goals within the project.
2	Implement new system or keep the old system.	Yes. Project leaders vs. super user on the old system.
3	Start the new system with a clean slate or migrate data from the old system.	Yes. Project leaders vs. system owners.
4	Implement primarily as a technical installation or implement as a socio-technical change process	Yes. Project leaders and the project group vs. user representative in the reference group.
5	Select the best system, irrespective of future risks, or avoid selecting a vendor that carries future risks.	No.

The first set of conflicting goals was evident in all three cases. In case 1, one vendor was excluded; however, I was able to access documents that show the procuring entity was still careful to inform this vendor regarding decisions made during the process. In cases 2 and 3, the e-mails show how the procuring entities were careful to ensure that all tenderers received exactly the same information. In addition, the scheduling of the meetings shows that all tenderers had the same amount of time to prepare and run their presentations. Furthermore, in case 2, the procuring entity was careful to give the vendors exactly the same amounts of time between negotiation meetings. In the same

way, it was obvious in all three cases that the procuring entities had the goal of obtaining the system that best met the information requirements. A significant part of the meetings I attended focused on how the vendors' offers met these requirements. However, in my observations I did not see any signs of focusing on the requirements without at the same time balancing this with conducting a formally correct procedure.

The second set of conflicting goals was identified in only one of the cases. The leader of the overall message exchange project understood the need for a new EHR system fairly early in the process. Indeed, she and the procurement project leader had a clear goal for procuring and implementing a new system. The opposing goal was related to one of the stakeholders. For "the first half year" of the procurement project, it was clear to the leader of the overall message exchange project that "a new system was not wanted [by the opposing stakeholder]; there was, rather, a wish to try tinkering [with] the old." The stakeholder in question had a vested interest in the old system, and he wanted to keep it for a couple of more years and "try tinkering" with it to meet the requirements for message exchange. He based his argument for this on his expectation that new government requirements (related to the introduction of a core national health record) would be introduced within a couple of years, which could require another procurement process.

The third set of conflicting goals was also only evident in one case, and it was related to a conflict that involved two stakeholders—the super user of the old system and super user of the new system—who opposed the procurement project leader and the leader of the overall message exchange project. The project leader and the leader of the overall message exchange project wanted to start the new system with a clean slate: that is to say, they wanted to re-register all historical data so as to ensure good data quality. In contrast, the two super users wanted to migrate data from the old system to save work. This became evident during one of the meetings where the super user of the old system handed out a note showing what he thought needed to be converted and migrated from the old system. His input was completely ignored, but I kept a copy of the note. This conflict was later confirmed in my interviews both with the two super users and the project leaders.

The fourth set of conflicting goals was evident in case 2. This conflict was apparently not evident to the project group before the system was implemented. This is clear from how the project group scheduled activities, such as training, without addressing

possible organizational changes or changes in work processes. It is also clear that they were too late in realizing the contradiction, and the need to address this. The project leader later admitted, "I don't think one really understands that changing a system can have [such] large consequences …The booking office is suffering somewhat now."

The fifth set of conflicting goals was evident in both case 1 and case 2. In all cases, it was evident that one goal was to select the best system. In case 1, the procuring entity faced the risk of selecting a vendor that the team regarded as vulnerable and possibly unable to maintain and update the system; however, the team also discussed the possibility of this vendor having the best system. In case 2, the procuring entity faced the risk of selecting a vendor with unacceptable contract terms; however, as the choice of strategy shows (6.1.3), the procuring entity had also the goal of choosing the best system, irrespective of future risks.

Section 6.1.3 will show that all these five sets of conflicting goals are instances of contradictions, and will analyze the strategies that were applied to deal with the challenges, and, in my cases, the contradictions.

6.1.3 Strategies to deal with the main challenges and the contradictory goals

The third research question was:

RQ3. What strategies do public entities use to cope with these challenges and with contradictory goals?

As stated in section 1.2, some of the conflicting goals identified in the cases (section 6.1.2) may be contradictory; the conflicting goals are thus specific instances in these cases of more generic contradictions. In the following section, my focus is on the contradictory goals and their related challenges. Upon dialectical reflection, these contradictory goals were revealed to represent deep contradictions (see also sections 5.4 and 5.6). Here, I will elaborate on the strategies to cope with the challenges and contradictions revealed by the contradictory goals.

Strategies to deal with the main challenges

I identified strategies employed by public entities to deal with the challenges related to requirements specifications. With regard to requirements specification, the CIOs and

the procurement managers in the Delphi study ranked two challenges as high: clear requirements specifications and complete requirements specifications. In cases 1 and 2, the procuring entities learned from the other public entities, as elaborated above. In both cases, the procuring entities spent a considerable amount of time specifying requirements and going through them one at a time to decide whether or not to include them (either as "needed" or as "nice to have"). Nevertheless, the procuring entity had to run an additional tender in case 2, because the entity discovered that it needed add-on software sometime after implementing the EHR-system it had procured. Hence, this strategy was not entirely successful. The vendors also identified a number of challenges and ranked feasible requirements as the second most important challenge. In both case 1 and case 2, the procuring entities spent a considerable amount of time distinguishing between features that were "needed" and features that were "nice to have": hence, these two procuring entities had deliberate strategies for how to develop feasible requirements.

Strategies to deal with contradiction 1: Follow regulations vs. satisfy system needs
The first set of conflicting goals - "conduct a formally correct procedure or select the system that best meets the project's needs", are instances of a more generic contradiction - "follow regulations vs. satisfy system needs".

I identified two strategies to meet the contradictory goals. This first set of contradictions is related to the requirements specifications and experience of other public entities. In two of the cases, the procuring entity spent a considerable amount of time on the requirements specifications and on learning from those who had experience of related procurement projects within the informal and formal networks of public entities. The procuring entities applied the learning in both the requirements specification phase and the selection phase. My interpretation is that this strategy was successful to a certain extent. However, in case 1, the procuring entity experienced significant problems with the integration of the newly procured claims system and the legacy ERP system. None of the municipalities contacted by the procuring entity had attempted to integrate these systems previously, because they all had older versions of the claims system. Thus, in this case, there was no learning to be applied concerning the integration of the claims system.

The other strategy is related to the choice of procurement procedure. In case 1, the procuring entity chose restricted tendering, which is a procedure that does not allow

much dialogue. The system was simpler and less unique than the systems in the two other cases. In case 2, the procuring entity chose both strategies (i.e., first, learning from the networks of public entities in the processes of requirements specification and selection, and second, applying a procedure that allowed more dialogue—tendering with negotiations). My interpretation is that this project was more time-consuming than necessary for the procuring entity. However, this was due to the procuring entity spending a considerable amount of time on the requirements specifications, rather than on the procedure itself. Furthermore, the end result was good, because the procuring entity experienced only minor problems during implementation, and most of the users were satisfied with the new system. In case 3, the procuring entity chose a procedure that allowed more dialogue with the vendors (i.e., competitive dialogue); indeed it relied solely on this dialogue. According to the project manager, the procuring entity may not choose this procedure next time, as "it was very time-consuming." My interpretation, however, is that the result of this process was good in the sense that the procuring entity was satisfied with the system it chose, and neither the procuring entity nor the vendors spent significantly more time than was spent in case 1.

Strategies to deal with contradiction 2: Change vs. persistence

The two conflicting goals that relate to the implementation of a new system or the maintenance of an old, are also instances of a contradiction. This contradiction concerned the project leaders' goal of procuring a new system and the legacy system super user's goal of sustaining procurement and keeping the old system for a couple more years. I identified only one strategy for dealing with this dialectic, which was to apply power, carry out the thesis and carry on with the project to procure and implement a new system. This strategy of applying power against stakeholders who are resistant to software procurement has been identified previously in IS research (Howcroft & Light, 2006).

Strategies to deal with contradiction 3: Revolution vs. incremental change

This contradiction refers to conflict over whether to start the new system with a clean slate or to convert and migrate data from the old system. It is related to the contradiction between change and persistence; the two goals are contradictory. The strategy proposed by the project leader was twofold: first postpone the decision (so as not to interfere with the process of selecting the system) and, second, get advice from the vendor regarding how much to convert and migrate. This strategy of applying external expertise appears similar to what Howcroft and Light (2006) termed

"conceptual power" and "symbolic power" (see also Markus & Bjørn-Andersen, 1987), and may be useful in a stakeholder-related contradiction. In the end, the project leader decided to convert some of the data, ultimately meeting the opposition halfway.

Strategies to deal with contradiction 4: Implement primarily as a technical installation or implement as a socio-technical change process

This contradiction was apparently not evident to the project group before the system was implemented; hence, there was no deliberate strategy. They realized the contradiction, and the need to address it, too late. The project leader later admitted, "…The booking office is suffering somewhat now." Hence, in this case, a lack of strategy had negative consequence for the booking office. (The finding of the contradiction and of the lack of a strategy is based on interviews with user representatives from 4 of the 16 units involved.)

Strategies to deal with contradiction 5: Select the best system, irrespective of future risks; vs. avoid selecting a vendor that carries future risks

The procuring entities employed different strategies in the two cases related to this contradiction. In case 1, the procuring entity excluded the vendor that it regarded as representing a risk. In case 2, the procuring entity first made the vendor change the contract terms to minimize the future risk. Then, the procuring entity decided not to exclude the vendor, even though the contract terms were not changed to their full satisfaction. This strategy of minimizing future risk before selection was successful; the effect was that the procuring entity was able to choose from two highly competitive systems in the last round of negotiations. A similar strategy of minimizing an antithesis may also be applicable in other contradictions.

In the rest of this chapter, I elaborate on the contributions of this study.

6.2 Contributions

I start this section with my main contribution: the dialectics I have identified in the public procurement of IS. The dialectics are based on the contradictions presented in the preceding section, and I will in section 6.2.1 show for each of them how the contradictory goals can be understood as theses and antitheses. Further I will show how these contributions relate to previous research. I analyze the dialectics by using stakeholder theory as analytical lenses for the cases in which there were stakeholders representing the thesis and antithesis, to show how a stakeholder analysis adds to our understanding. Section 6.2.2 sums up the dialectics, and section 6.2.3 elaborates on the synthesis for the main dialectic. Based on this, I present a prescriptive framework for selecting procedure in section 6.2.4, before presenting an updated model of the public procurement system in section 6.2.5.

6.2.1 Dialectics in the public procurement of IS

The deep contradictions identified from the analysis of conflicting goals (see section 6.1.3) are stated as the five dialectics below. Table 6.2 shows the conceptual path from the conflicting goals to the main dialectic.

1. Dialectic of requirements specifications
2. Dialectic of change
3. Dialectic of the nature of change
4. Dialectic of implementation
5. Dialectic of risk

Table 6.2: Conceptual path from conflicting goals to dialectic

Conflicting goals	**Contradiction**	**Dialectic**	
Conduct a formally correct procedure or select the system that best meets the project needs	Follow regulations vs. satisfy system needs	Dialectic of requirements specifications	Thesis: *Abiding by the principles of the EU regulations on public procurement*
			Antithesis: *Obtaining the system that best meets a public entity's complex information requirements, irrespective of constraints*

These dialectics are elaborated below, starting with the main dialectic.

Dialectic of requirements specification

The analysis shows that the main dialectic, the "dialectic of requirements specification," was important in all three cases. The manifestation of this dialectic is the challenge of requirements specifications and the restrictions on dialogue between procuring entities and vendors, as pointed out in section 6.1.1. This is the main dialectic in the public procurement of IS, and it is not related to specific stakeholders. The dialectic manifested itself as a contradiction between:

> ***Thesis:*** *Abiding by the principles of the EU regulations on public procurement (i.e., openness, transparency, and equal opportunities for all vendors)*
>
> ***Antithesis:*** *Obtaining the system that best meets a public entity's complex information requirements, irrespective of constraints*

In all three of my cases, there were two conflicting goals - conduct a formally correct procedure, or select the system that best meets the project's needs. These two goals are instances of logically opposite forces; if the procuring entities choose one, they have to neglect the other. Both the strategies identified in section 6.1.3 represent a synthesis to the dialectic. In the following I will elaborate further on the thesis and the antithesis.

Abiding by the principles of the regulations implies an open and transparent process. This requires that all vendors enjoy equal opportunities and equal access to information. The regulations on these matters are strict. A tenderer may file complaints if it believes that other vendors have received more information than it has. One outcome of this is that procuring entities are careful not to involve any vendor in developing requirements specifications before announcing a call for tender. The reason is that this would give that vendor a competitive advantage by potentially influencing the specifications and by allowing the focal vendor early access to information. Thus, to avoid these issues, public procurement entities try to keep vendors at "arm's length."

There is another implication of following the thesis. A procuring entity may have an idea of which vendor it will select, and it may want to give this vendor more information, in the hope of running a smoother process or helping this vendor tailor an offer to the information requirements. However, EU regulations strictly mandate that all vendors must receive equal information. One way for a procuring entity to ensure

equal information is to limit the amount of information it sends to vendors. However, limiting the information flow may make it more difficult for the procuring entity to decide what the requirements are and what the best solution is. There is a risk that a procuring entity will not know its needs—and, thus, that the requirements specifications will not be complete. Thus, another solution to the equal opportunity problem is to ensure that all vendors get all information. This is a resource-demanding solution, but it may lead to offers that are better suited to requirements.

The antithesis - "Obtaining the system that best meets a public entity´s complex information requirements, irrespective of constraints" - may require extensive dialogue with the vendors in order to learn about the information requirements. It may even mean that the requirements specification has to be changed during the tendering process. Running a dialogue with different vendors is not possible for some of the procurement procedures (see section 2.2), and there is a risk of breaching the principles of the EU regulations. Changing the information requirements is also breaching the principle of the regulations on equal opportunities for all vendors. Vendors may decide whether or not to take part in a tendering process based on the information requirements that are stated in the call for tender, and if this is changed later in the process, vendors cannot change their decision on whether or not to participate.

This dialectic has not been previously addressed in public procurement research; indeed, Thai (2001) only addressed the contradiction between different socio-economic goals. It is known in systems development research, however agile development methods opens for the possibility of learning about information requirements during the development process and changing the requirements specification. My analysis of the cases revealed two syntheses related to the dialectic of requirements specifications, which are elaborated in the next subsections (6.2.2 and 6.2.3). However, I will first elaborate on the other dialectics that were identified; as they were less dominant, this will be done more briefly.

Dialectic of change

I have termed the second dialectic the "dialectic of change." This dialectic was identified in case 2, which involved the procurement of an EHR system that was

needed for message exchange between the municipality system and the hospital system. The dialectic manifested itself as a contradiction between:

Thesis: Change
Antithesis: Persistence (i.e., keeping the system unchanged)

In a change process there will always be a force pulling towards change for improvement, and there will be a force pulling towards persistence; as this is always less expensive and requires less effort. Hence, the two conflicting goals are related and pull apart. Again, choosing one means neglecting the other.

This dialectic has not been identified or addressed previously in public procurement research. However, it is not unknown; rather, it is a common observation in systems development and has been addressed elsewhere in IS research (see, for example, Markus, 1983; Robey et al., 2002).

The dialectic was analyzed and explained in paper 4. However, the contradiction is stakeholder related, and bringing in this theory adds to our understanding. In systems development projects, the stakeholders that represent persistence would not normally belong to the systems development group. However, in this procurement project, the procurement project leader represented the thesis, which was to implement the new system - and, hence, enable message exchange. A super user of the legacy system represented the antithesis. According to the leader of the procurement project this stakeholder was opposed to procuring a new system; it simply took the project group some time to realize this. An analysis of these two stakeholders (see table 6.3) shows that the project manager has considerably more power and legitimacy. The procurement in question was considered to be urgent for the implementation of the overarching message exchange project; hence, it was also urgent for the procurement project leader. It may also have been considered urgent by the super user, who wished to keep the system unchanged, because his role was connected to this system.

Table 6.3: Attributes of the stakeholders in the dialectics of change

Role	**Power**	**Legitimacy**	**Urgency**
Procurement project leader	High	High	High
Super user of legacy system	Medium	Medium	Possibly high

Altogether, the above analysis shows that the procurement project leader had more salience than the super user, which explains the ultimate selection of the thesis as a strategy. Even though the opposition lasted for "half a year" (leader of the overall message exchange project), the procurement was ultimately carried out.

The dialectics of change and the dialectics of the nature of change may be severe in large projects spanning many departments (e.g. enterprise systems), however, in this case, it seems to have been limited to a conflict between the super user and the procurement project leader.

Dialectics of the nature of change

I have termed the third dialectic the "dialectic of the nature of change." This dialectic was also identified in case 2 and presented in paper 4. The dialectic manifested itself as a contradiction between:

Thesis: Revolution
Antithesis: Incremental change

In this case the project leaders' goal was revolutionary change, they wanted to start with a clean slate, as they feared that the old data may be erroneous. The super users had conflicting interests and their goal was incremental change, as this is less expensive and requires less effort. Thus, the goals are opposing forces; they are related and pull part.

This dialectic is related to the second dialectic; however, incremental change is not necessarily the same as opposition to change. This dialectic has not been identified or addressed previously in public procurement research. However, it is known from research on the implementation of IS, belonging to what Robey and Boudreau (1999) called "the logic of opposition". This dialectic is also stakeholder related, and bringing in this theory adds to our understanding. Both the procurement project leader and the leader of the overall message exchange project represented the thesis, and their goal was to start the new system with a clean slate. The antithesis was manifested in the opposition of the super user of the new EHR system and the super user of the old one. Both of these stakeholders wanted to convert data from the legacy system and migrate these data to the new system, because of the amount of work that would be incurred by re-registering all of the data. However, the procurement project leader and the leader

of the overall message exchange project both wanted a completely new system with new data (i.e., a revolutionary change), fearing that the old data may be erroneous.

An analysis of these stakeholders shows (see table 6.4) that the project leaders had higher power than the super users, which supports the selection of the thesis. However, the question of whether to convert the old data or register all new data was more important to the two super users, because "they would be responsible for the manual work if we didn't migrate data", according to the procurement project leader. The conflict required a great deal of attention and lasted for a long time.

Table 6.4: Attributes of the stakeholders in the dialectics of the nature of change

Role	**Power**	**Legitimacy**	**Urgency**
Procurement project leader	High	High	Medium
Leader of the overall message exchange project	Medium - high	Medium	Medium
Super user of new system	Medium	High	High
Super user of legacy system	Medium	High	High

Altogether, the analysis shows somewhat equal saliences for the two "pairs" of stakeholders. This suggests a strong conflict, which may take time to resolve, and it suggests a synthesis. This dialectic was resolved, as shown in section 6.1, by applying external expertise. The end result was a synthesis, whereby only a limited amount of data was converted and migrated. The dialectics of implementation are more severe in projects in which the nature of change is large. In this case, the nature of change was large, because the system spanned large parts of the organization and the history of records in the old system dated back 20 years. This analysis also shows the power of combining dialectics and stakeholder theory, as previously suggested (Flak et al., 2008).

Dialectic of implementation

I have termed the fourth dialectic the "dialectic of implementation." This dialectic manifested as a contradiction between:

Thesis: Implementation as a primarily technical task
Antithesis: Implementation as a socio-technical change process

The project leaders ran the implementation primarily as a technical task. Their goal was to manage conversion of data and setting of parameters in the new system to represent the organization. By choosing this, they neglected the alternate goal; hence, the two goals are instances of opposing forces, of a thesis and antithesis.

This dialectic has not previously been addressed in public procurement research, although it is well known in the implementation of IS in general. The contradiction between technical change processes and socio-technical change processes has been researched extensively (see, for example, Bygstad, Nielsen, & Munkvold, 2010; Myers, 1995), and in the field of public procurement, it may be unique to procurement of IS.

The dialectic manifested itself in case 2, in which the whole procurement project group represented the thesis, and the antithesis was related to a specific stakeholder, who represented a unit with specific interests (the office in charge of the booking of home care services). In this case an analysis of the stakeholders shows (see table 6.5) that the user representative had very little formal power, despite having a high degree of urgency and legitimacy. The project group was quite deliberate in how it used the user representatives, as well as how it limited their power. For example, the user representatives were invited to take part in a full-day workshop and to visit one another's municipalities to see their EHR systems during the requirements specification phase; however, they were told that it would not be possible to take all their needs and wishes into account. They were also invited to take part in a demonstration of the solutions and to evaluate these solutions during the negotiations. However, the project group was very careful not to give the user representatives too much leeway to ask questions.

Table 6.5: Attributes of the stakeholders in the dialectics of implementation

Role	**Power**	**Legitimacy**	**Urgency**
Procurement project group	High	High	High
User representative of the booking entity	Low	High	High

Altogether, the analysis shows a high salience for the project group and considerably lower salience for the single user representative. Specifically, the analysis shows that

the single user belonged to what Mitchell, Agle, and Woods (1997) termed the "dependent stakeholder" classification: stakeholders that depend on other stakeholders or the entity's managers to carry out their will. Hence, since the project leader did not see the needs of this user or his entity, the thesis won.

Dialectic of risk

The fifth dialectic, the "dialectic of risk," manifested itself in both case 1 and case 2:

Thesis: Select the best system, irrespective of future risks
Antithesis: Avoid selecting a vendor that carries future risks

The conflicting goals related to risk are logical opposites; hence they are instances of a thesis and antithesis. In the two cases, selecting the best system would imply neglecting the future risk, and vice versa.

This dialectic relates to the tension between the risk of leaving in the running a vendor that has vulnerabilities or unsatisfactory contract terms, and the risk of excluding the vendor with the best system. It is not related to any of the internal stakeholders. This dialectic manifested itself in case 1, in which one vendor was excluded due to vulnerability. This decision was made before the procuring entity had evaluated the offer. The dialectic also manifested itself in case 2, in which the procuring entity considered disqualifying one vendor because of the contract terms; however, the procuring entity left the vendor in the running because, otherwise, it would risk losing the opportunity to select the best system. The dialectic of risk is most severe in markets in which the choice of vendors is limited, because vendors in these markets have higher bargaining power. In the two cases in which this dialectic was identified, two (in case 1) and three (in case 2) vendors took part in the tendering process.

Risk management is a new issue in public procurement research. It may prove to be an important issue in the public procurement of IS, because the procurement of IS involves not just making a decision about which system to procure, but also which vendor to sign up, with a contract that may last for several years. In the two cases where the dialectic was prevalent, the project groups chose different strategies. From my findings I can only speculate as to the risk, because it is not possible to work it out in exact terms. In case 1, there was a risk that the vendor that was disqualified may not be in operation for the whole contract period; however, this is not known until the

contract period is over. In case 2, the procurement project group got the vendor with the unacceptable contract terms to adjust them, and this seems to have worked out satisfactory, as it gave the project group the option between two competing vendors in the final negotiation round. The issue of risk management has previously been studied both in general (see e.g. Birkmann et. al. 2011, Kappes et al. 2013) and in IS, with the main focus on security risks (Stoneburner et al. 2002, Tohidi, 2011), and on risks in systems development (Barki et al. 1992; Ropponen and Lyytinen, 2000).

6.2.2 Summing up the dialectics

Altogether I identified five dialectics in the cases; these are shown in table 6.6:

Table 6.6: Overview of dialectics

Name	**Thesis**	**Antithesis**
Dialectic of requirements specification	Abiding by the principles of the EU regulations on public procurement (i.e., openness, transparency, and equal opportunities for all vendors)	Obtaining the system that best meets a public entity's complex information requirements, irrespective of constraints
Dialectic of change	Change	Persistence (i.e., keep the system unchanged)
Dialectic of the nature of change	Revolution	Incremental change
Dialectic of implementation	Implementation as a primarily technical process	Implementation as a socio-technical change process
Dialectic of risk	Select the best system, irrespective of future risks	Avoid selecting a vendor that carries future risks

The first dialectic, the dialectic of requirements specification, is found to be the main dialectic; hence, the resolution to this dialectic is elaborated in detail in the next section.

6.2.3 Syntheses for the dialectic of requirements specification

The strategies for contradiction 1 (see section 6.1.3) both serve as syntheses for the dialectic of requirements specification. These strategies for public procurement of IS

have not been previously identified. The syntheses are elaborated further in this section.

6.2.3.1 Learning from networks

One synthesis that was evident in two of the cases was learning from networks of procuring entities. This is a synthesis as it does not conflict with the regulations, and attempts to obtain the system that best meets a public entity's complex information requirements, irrespective of constraints. However it may not abide fully with the principles of the regulations on equal opportunities, because learning from networks may favour the appreciation of the different vendors and their offers. Further, it may not ensure obtaining the system that best meets the information requirements as the network might not be sufficient to learn the information requirements completely.

This synthesis was evident in different ways in case 1, in which restricted tendering was applied. The procurement manager learned the need to include exclusion criteria from a colleague in another municipality. Furthermore, the project group borrowed requirements specifications from two other municipalities (the claims manager considered one of these two municipalities to be the best in Norway within this domain). Finally, the project group researched the experiences of municipalities that had procured the system within the last two years from the vendor selected by the procuring entity.

This synthesis was also evident in case 2, in which the procuring entity applied tendering with negotiations. Here, learning was achieved in three different ways. The project group and parts of the reference group in the procuring entity visited three municipalities to aid their brainstorming. Furthermore, the project group in the procuring entity again borrowed requirements specifications, this time from a neighboring municipality of equivalent size. Finally, the project group researched other municipalities' previous experiences of procuring EHR systems from the vendor the group had finally selected.

I did not find any traces of applied learning from a network of public entities in the third case. The question that remains is whether this synthesis could have been applied in this case as well. In applying competitive dialogue, the project group learned a great deal from the vendors; thus, learning from other public entities was potentially unnecessary. On the other hand, it is possible that other municipalities had undergone

a process of procuring backups and archives in the recent past; hence, learning from other municipalities could have been useful. However, this procuring entity had an additional reason for choosing competitive dialogue; it wanted to try out the tendering procedure so that it could apply the procedure to future projects—if the project turned out well.

There are some consequences of selecting this strategy of learning from networks. One consequence is that procuring entities acquire more information before engaging in a dialogue with vendors; hence, there may be less information asymmetry between vendors and procuring entities. One risk, however, involves relying too much on the network (e.g., through an uncritical duplication of other public entities and their requirements specifications). Tailoring requirements specifications to the procuring entity's needs is absolutely necessary, because public entities differ in size, in organization, and in the business processes they run.

6.2.3.2 Choice of procedure

The other possible synthesis for the dialectic of requirements specifications is the choice of a tendering procedure that meets the goals of transparency and equal competition while, at the same time, allowing some degree of flexibility in requirements specifications and vendor dialogue. The choice of procedure was different for all three cases, and there are clear differences between the four main procedures (see section 2.2).

The first two main procedures essentially represented the thesis as a resolution: abiding by the principles of the EU regulations on public procurement (i.e., openness, transparency, and equal opportunities for all vendors). Open and restricted tendering approaches do not allow dialogue with vendors prior to the specification of requirements, with the exception that procuring entities can answer questions in order to clarify the tender announcement. However, apart from this, the process only allows for the demonstration of the solution. Restricted tendering was applied in case 1 and the resulting integration issues turned out to be complex. The procuring entity was one of the first municipalities/organizations to procure this version of the system; hence, there was insufficient knowledge in the network for support. Tendering with negotiation might have provided the entity with a greater opportunity to identify problems up front.

The two other generic procedures - tendering with negotiations, and competitive dialogue, allow more flexibility and dialogue; hence, they are syntheses in themselves. There are differences between these procedures: tendering with negotiations does not allow much flexibility in requirements specifications, but its negotiation phase does facilitate dialogue and the possible fine-tuning of specifications; hence, more knowledge can be gained in the selection process. Competitive dialogue, on the other hand, facilitates more dialogue in the requirements specification; however, all vendors should still receive the same information. Once the requirements are set and announced to the competing vendors, there is no room for further dialogue.

However, even if the requirements are perfectly known, there is a risk that the offers will be unclear, in the sense that a procuring entity may not be able to grasp whether an offer meets all the requirements. Findings from case 2 show that the vendors had incorrectly ticked off whether they met the requirements in their offers. Thus, dialogue with vendors may be needed, both in the process of requirements specifications and in the selection phase. Hence, both of these tendering procedures have constraints, and neither can be said to allow enough dialogue and flexibility to be certain of "obtaining the system that best meets a public entity's complex information requirements".

There are also consequences of a tender strategy that allows a dialogue with the tenderers. Such a strategy could possibly lead to the tenderers taking advantage of information asymmetry (e.g., Dawson et al. 2010). Finally, the dilemma of when to choose which synthesis also remains. Section 6.2.4 will elaborate on this dilemma, and suggest a novel framework for choice of procedure, based on the preceding contribution (section 6.2.3.2).

6.2.4 A prescriptive framework for selecting procedure

I have developed a prescriptive framework for selecting procedure. Based on my findings in paper 5, I propose the framework for selecting the most appropriate tendering procedure for a situation, as shown in table 6.7. This framework is based on the complexity of requirements and the uniqueness of a system.

Table 6.7: Framework for selecting procedures in the public procurement of IS

	Non-complex requirements	**Complex requirements**
Non-unique system	Not much interaction with vendors needed. If needed, borrow requirements specifications from other public entities. Selection of procedure is straightforward. Appropriate procedures: Open tender or restricted tender	Learning from other public entities is an effective strategy, even if only to communicate with vendors. Some interaction and dialogue with vendors is necessary to evaluate the systems. Appropriate procedure: Tendering with negotiations.
Unique system	Learning from other entities is less likely to be successful. Interaction and dialogue with vendors is likely to be helpful. Appropriate procedures: Tendering with negotiations or competitive dialogue.	Learning from other public entities is not possible. Interaction and dialogue with vendors is essential. Appropriate procedure: Competitive dialogue

If a procurement process is straightforward and the procuring entity has the necessary experience and knows all of its requirements well, learning from others should not be necessary. In this case, applying "network resources" or engaging in a dialogue with vendors may simply be a waste of time and resources. Once the processes of knowing and specifying requirements become more complex, learning from others is a good strategy (alternatives include reading, following courses, or buying knowledge in the form of consultancy). Learning from others in a network of public entities is a good strategy when the others have knowledge that can be shared. However, if a procurement is unique this may not be the possible.

This framework is a simplification, since most system are somewhere on a continuum between simple (non-complex) and complex, and common (non-unique) and unique. In addition, there may be other factors that influence a procuring entity's choice of strategy, such as internal competence regarding actual procurement procedures, relationships with other public entities and the abilities of both the vendors and procuring entity to engage in a dialogue. Figure 6.1 shows these alternative decisions in a decision tree:

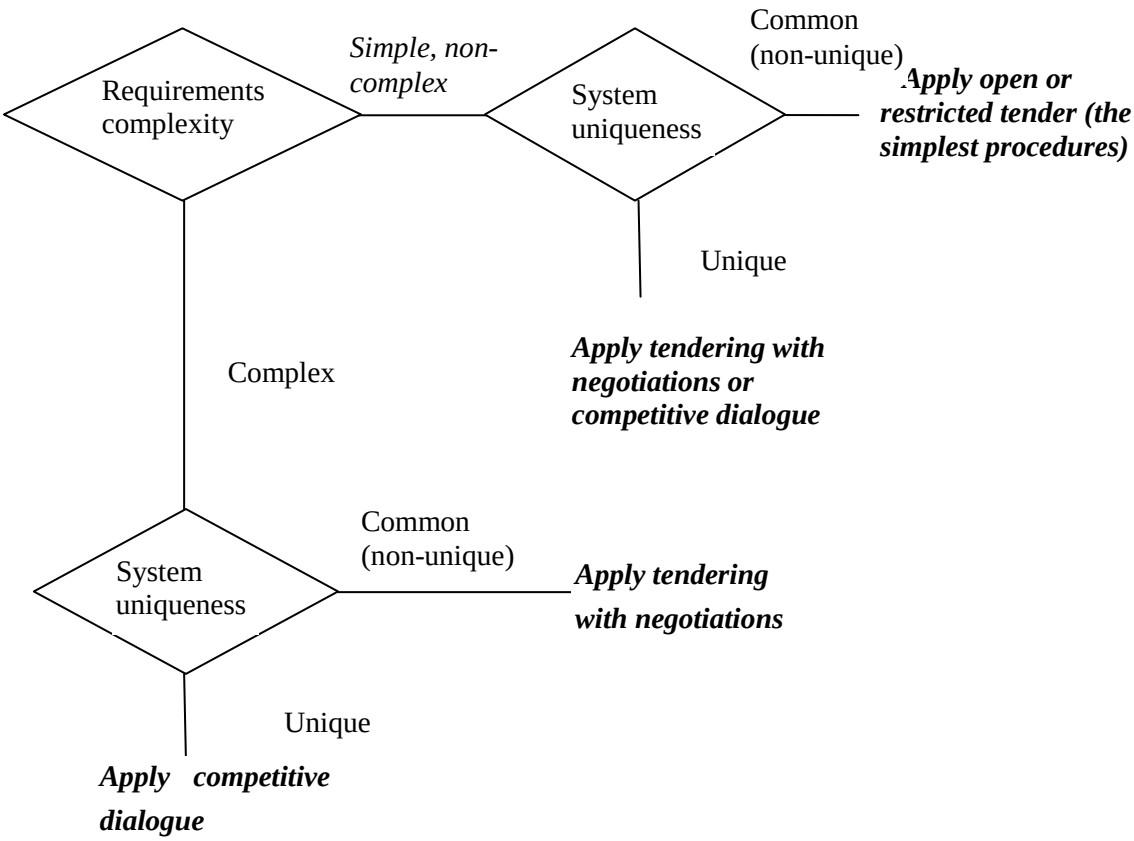

Figure 6.1: Decision tree for the choice of tendering procedure

6.2.5 Updated model of the public procurement system

My case studies have focused on the process of the public procurement of IS, and they show that this process is part of a system. My literature review was based on Thai´s model of the "procurement system in action" (2001). Thai (2009) later revised this model slightly. The revised model is somewhat simpler, consisting of four factors, laws and regulations, procurement organizations, procurement workforces, and procurement processes and methods. However, authorization is an element of organization. This model still has some weaknesses (these are pointed out in section 2.1). Policymaking and management are also not part of the revised model. Based on my findings, I suggest an updated model (shown in figure 6.2), which addresses some of the deficiencies of Thai's original model (2001). A further explanation of the model and how it addresses the weaknesses in the original model is given below.

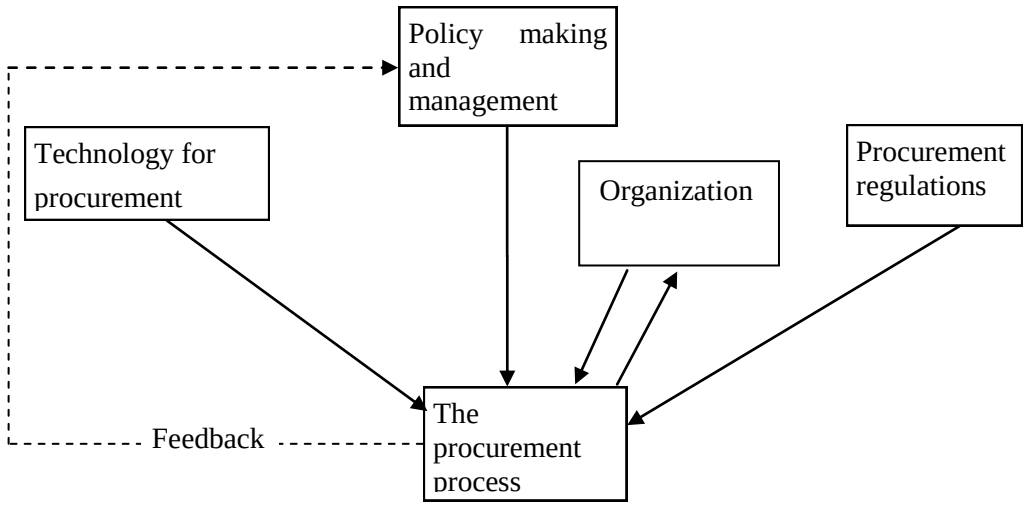

Figure 6.2: Updated model of the public procurement system

Section 2.1 showed the need to divide box 4, "procurement function in operations," into multiple boxes. This section also showed that box 3, "authorization and appropriation," could be removed. In my discussion of the model, I also claimed that some of the arrows were incorrect, as follows:

1. *The procurement function in operations affects policymaking and management*
2. *Regulations affect and are affected by the procurement functions in operations*

Finally, I claimed that the model lacked temporal factors.

In the updated model, the most significant change is that the "procurement function in operations" (box 4 in the original model) is split into three boxes: "Technology for procurement," "organization," and "the procurement process."

In the updated model, "the procurement process" is constrained by "procurement regulations," as can be seen in section 2.1.2 and in my cases. Furthermore, "policymaking and management" influences "the procurement process" through the identification of procurement needs, through the actual requirements specifications, and (possibly) through the selection in a tendering process (see also section 2.1.1). "Technology" will also affect "the procurement process" through, for example, databases for electronic tendering announcements, as well as e-procurement portals. Lastly, "organizing" affects "the procurement process" through such issues as the

selection of who is involved, the centralization of authority (e.g., to a procurement department), and phase division (or choice of procedure).

The box entitled "authorization and appropriations" (box 3 in the original model) is deleted and included as a part of "organization". Furthermore, there may be immediate feedback from "the procurement process" to only one of the influencing factors: "organization." The organization of a project may also be changed during the course of a process as a result of the outcomes of the different phases or the challenges. There may also be indirect and delayed feedback from "the procurement process" to "policy making and management", because a procuring entity's policies are changed occasionally, possibly as a result of one or several procurements. However, there is no feedback from "the procurement process" to "procurement regulations," because one project cannot change the legislation for the whole EU/EEA. According to Thai (2001), the courts in the US try all legal cases that involve the federal government, including contract disputes, and their decisions become sources of federal procurement regulations. Hence, in the US, the procurement process may affect regulation. Finally, there is normally not a link from "the procurement process" to "technology for procurement," because the technology is assumed to remain stable during a project.

6.3 Summary

This chapter has given an overview of how the research questions were answered and has discussed these questions in some detail. The overview has focused on the main challenge, on the five conflicting goals identified, and on the strategies applied by the public entities in our cases to solve the dialectics that arose from conflicting goals.

Furthermore, this chapter has given an overview of the contributions made by the dissertation, as shown in table 6.8. In particular, it focused on the dialectics of requirements specification and on the two identified syntheses. This chapter also presented a prescriptive framework for selecting a synthesis for this dialectic. Finally, the chapter presented an updated conceptual model of public procurement.

Table 6.8: Summary of contributions

No.	Description	Significance
1	Dialectics in public procurement of IS: a) Dialectics of requirements specification b) Dialectics of change c) Dialectics of the nature of change d) Dialectics of implementation e) Dialectics of risk	The significance of each of these dialectics differs. The dialectic of requirements specifications is the main dialectic for all public procurements of IS, since requirements specification represent the most important challenge in IS procurement. The dialectics of change and the dialectics of the nature of change may be severe in large projects that span many departments (e.g., enterprise systems, such as in case 2). The dialectics of implementation are also more severe in projects in which the nature of change is large. In all of these dialectics, the choice of strategy—that is, whether to find a synthesis or pursue the thesis (or antithesis)—is important. The dialectic of risk is most severe in markets in which the choice of vendors is limited, since vendors in these markets have higher bargaining power.
2	A framework for selecting a tendering procedure	This framework prescribes what procedure to choose and whether learning from other public entities should be applied. The choice of procedure is definite in the sense that a procuring entity cannot switch to a different procedure once the tendering has been announced. The choice of learning from other public entities can be applied in several of the phases (likely more than was done in the cases explored here). However, public procurement procedures are like a "waterfall process:" that is, once a phase is completed, the next phase starts, and iterations are not possible.
3.	Updated conceptual model of public procurement	This model guides future research on public procurement.

7. Conclusion

To conclude, this dissertation provides an opportunity to summarize and to look forward. To accomplish this, I will give a short summary of the dissertation and point to some of its limitations. I will also suggest some ideas for further research that may contribute by addressing some of the noted limitations. Finally, I will share a portion of my journey through this research.

7.1 Summary

In this dissertation, I studied the process of the public procurement of IS. Specifically, I examined this process through three research questions. Through the three case studies I observed how complex and time consuming public procurement of IS can be, both for procuring entities and vendors. I also observed how much care they took in the process and the possible severity of the consequences of different actions, such as disqualifying a vendor due to a risk, or keeping a vendor in the competition in spite of an associated risk.

The first research question concerned the challenges faced by public entities when procuring IS, and to study this, I used a Delphi study. The study employed three different panels of experts, including CIOs and procurement managers from public entities (mainly municipalities), as well as sales managers from IS vendors that target the public sector. The three panels identified a large number of challenges and ranked 19 of them in two consecutive rounds.

The results show significant differences in the rankings of the panels. However, requirements specifications was shown to be the most serious challenge across the groups of stakeholders—even though these stakeholders had different views on the characteristics of ideal requirements (i.e., CIOs wanted them to be clear and complete, while the vendors wanted them to be feasible). Further, paper 2 shows that benefit realizations and changes in the work processes were ranked among the top challenges by all panels; however, it should be noted that the panel made up of vendor experts ranked “too much focus on cost” as the number one challenge.

The second research question concerned the conflicting goals faced by public entities when procuring IS, and to study this, I employed an interpretive multiple case study.

By following three cases that differed in terms of important issues (i.e., type of system, organization of process, type of procedure), I identified five sets of conflicting goals. Furthermore, by employing stakeholder theory and dialectics as interpretive lenses, my findings revealed these goals to represent deep contradictions, which I stated as five dialectics: dialectics of requirements specification, dialectics of change, dialectics of the nature of change, dialectics of implementation, and dialectics of risk taking. The dialectic of requirements specifications was prevalent in all three cases. This finding, combined with the fact that requirements specifications ranked as the most serious challenge of IS procurement, indicates that the dialectic of requirements specifications is the most important dialectic.

The third research question concerned the strategies the public sector could use to cope with the challenges identified in RQ1, as well as with the contradictory goals resulting from RQ2. This research question was studied through the aforementioned three case studies. I focused on the main dialectic: the dialectic of requirements specification.

The dissertation identified two syntheses to the dialectic of requirements specifications: learning from a network of public entities and engaging in a dialogue with vendors through the choice of an appropriate procedure. Furthermore, the dissertation suggested a prescriptive framework for the choice of synthesis, based on the uniqueness of the system and the complexity of the requirements specifications. This framework has implications for practice. Specifically, it recommends more dialogue with vendors in the procurement of unique systems with complex requirements. In the procurement of systems that are more common, learning from other public entities is recommended as a strategy.

7.2 Limitations

Like any study, my study has limitations. My findings stem from Norway, a country that applies EU regulations. However, the insights on the public procurement process can arguably be relevant to other parts of the world that have similar regulatory structures.

The Delphi study employed three panels of experts, including: CIOs, procurement managers, and vendor sales managers. However, the CIOs and the procurement managers came mainly from large municipalities—areas that enjoy a large degree of

autonomy in Norway. Selecting experts from smaller municipalities, or other parts of the public sector, might have led to somewhat different findings.

My selection of cases may have been skewed. In cases 1 and 2, the procuring entities took some time before deciding to allow me to follow their procedures. One can speculate whether procuring entities that allow researchers to follow their work closely may also be the entities that are more ready to "bend the rules." Moreover, the processes were very clean, except for internal conflicts in case 2. Furthermore, three cases represent quite a small sample, which does not allow for the replication of findings or *literal replication* (Yin, 2009), especially since the cases deliberately differ.

My selection of interviewees also represents some limitations, especially in case 2, in which there was a reference group of users representing 16 different units. I was only able to interview four of these users, though there may have been other units that also "suffered" from the project group's lack of understanding of the need for "organizational change". Furthermore I was not able to access meetings with all the vendors, nor was I able to interview them all.

I was careful to assure all respondents that the findings would be anonymized and that the results of the interviews would not be disclosed with any of their colleagues. I was also careful to be as unobtrusive as possible when attending the meetings. Still, there may have been some degree of a Hawthorne effect, in the sense that the project groups in the procuring entities may have been more careful in following the regulations because of my presence.

7.3 Future research directions

My literature review shows that there has been a lack of research on public procurement in general and on public procurement of IS in particular. This dissertation is an attempt to begin the process of building a body of knowledge in this important area, and a new and updated literature review may also show further progress. However, more research is still needed. There is still a need for multiple longitudinal case studies on the public procurement of IS covering procurement processes from the start of a tender until the systems have been implemented and the procuring entities

have accepted the fulfillment of the contract. In the following section, I elaborate on specific future research directions.

The dialectics of requirements specification and the choice of syntheses

A key issue for further research is the main dialectic and its two syntheses. The framework presented in section 6.2.5 requires validation. In order to achieve this validation, we must first operationalize precisely what the terms "uniqueness" and "complexity" mean with regard to requirements in systems to be procured. We also need to determine what other factors exist in selecting an optimal strategy for IS procurement. Case studies, a Delphi study of experts and procurement managers, and quantitative surveys are possible approaches.

The strategy of selecting a tendering procedure that allows dialogue with tenderers could possibly lead these tenderers to take advantage of information asymmetry (e.g., Watson et al. 2011). This is an avenue for further research. Another avenue is to study how procurement entities use and learn through their networks, as well as the challenges associated with following this strategy. Essentially, this strategy allows procuring entities to define the requirements of systems with which they are not familiar, without relying on vendors. Whether this is a conscious effort on the part of procuring entities to minimize their disadvantage *vis-à-vis* the tenderers (i.e., in terms of information asymmetry) is an interesting question. In the same vein, whether information asymmetry is reduced through dialogue with the vendor is another intriguing question.

Stakeholder issues

Stakeholder issues are among the challenges identified in the Delphi study, and stakeholder-related conflicts played an important role in case 2. There were also several stakeholders associated with the processes of the two other procurement projects. This has the potential to raise conflicts resulting from contradictory stakeholder interests and goals. Moreover, goals may change over time, creating shifting coalitions of stakeholders that may create problems for smooth procurement. Hence, research is required to find the optimal strategy for addressing stakeholder issues in public procurement. In-depth case studies and interpretive studies could help untangle the procurement process in order to prescribe how stakeholder issues should be addressed.

Vendor issues

Longitudinal case studies could open up the "black box" of some of the phases and answer some of the questions that still remain unanswered, particularly in relation to, for example, the difference in focus on requirements specifications between the procuring entity and the vendor. There is a lack of research on the vendor side of public procurement, and opening this "black box" could yield interesting insights.

The updated model of public procurement

Longitudinal case studies could address the need for research on the various links in the updated model of public procurement. For example, the link between "policy making and management" and "the procurement process" remains largely unexplored. More research is also required on the dilemma between adhering to procurement regulations and applying specific social goals. Future research could illustrate how public authorities can apply policy goals without breaching regulations, as well as how these goals influence different phases of the procurement process—especially the requirements specification phase.

The link between "organizing" and "the procurement process" also necessitates process research. An important research question involves the organization of the public procurement process, including how end users should be involved. In case 2, a reference group of end users was involved in the requirements specification and the selection. Whether this strategy of involving end users as a reference group (instead of as members of the project group itself) is effective or not represents an interesting avenue for future research. Further research could show what determines the best strategy for involvement.

Cross-country studies

Cross-country studies are needed to show whether my findings are limited to a Norwegian context or whether they may apply to other European countries—or even to other countries with similar regulations regarding public procurement. My Delphi study and my case studies all collected data from Norway. Studies from other countries might reveal more information about the generalizability of results to other countries with equally strict procurement regulations, as well as whether procuring

entities and vendors in these countries face similar challenges to their counterparts in Norway.

Workarounds in public procurement

My dissertation has focused on the challenges and contradictions in the public procurement of IS. However, it has not identified any workarounds or methods to bypass rules and regulations. This may be due to the limitations of my study (see section 7.2) concerning a skewed sample of cases and a possible Hawthorne effect. Thus, further research is needed to identify whether and how workarounds may take place.

7.4 Concluding remarks

Research on public procurement in general and on public procurement of IS is very limited and this dissertation only addressed one segment of this field. It investigated the procurement process and focused on key challenges and conflicting goals faced by public entities when procuring IS, and what strategies public entities use to cope with these challenges and conflicting goals. In my work, I have applied both the Delphi method and carried out interpretive longitudinal case studies. Furthermore, I have applied dialectics and stakeholder theory as analytical lenses. Other methods and possibly also other analytical lenses could be applied to give a richer picture, and section 7.3 points to a number of future research areas. However, through my findings, I offer contributions both to practice and to research.

In my case studies I applied a hermeneutic approach; that is to say, I moved from the whole to the parts and back to an understanding of the whole again. I returned again and again to transcripts of the interviews, and to e-mails and minutes from the meetings in order to gain a deeper understanding of the process and the different incidents. In so doing, I have gained a deeper understanding and appreciation of dialectics and stakeholder theory as analytical lenses. However, this process has also made me aware of the need to be explicit about prejudices and theoretical preconceptions, as well as to develop an understanding of the context of a study prior to engaging in subsequent data collection. With these considerations in mind, my modest hope is that my work will help practitioners and benefit future research.

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Appendix A. Research publications

No.	Title	Authors	Publication	Year
1	Research on Public Procurement of Information Systems: The Need for a Process Approach	Moe, C.E.	*Communications of the Association for Information Systems, 34*(1), Article 78	2014
2	Challenges in Information Systems Procurement in the Public Sector.	Moe, C.E. and Päivärinta, T.	*Electronic Journal of e-Government, 11(1), pp. 307-322*	2013
3	The Public Procurement of IS - A Process View.	Moe C.E. and Newman, M.	*Proceedings of Hawaii Int. Conference on System Sciences, pp. 2158-2167*	2014
4	Dialectics and Contradictions in Public Procurement of Information Systems	Moe C.E. and Sein, M.K.	*Electronic Government (IFIP 8.5 conference), pp. 289-300, Berlin Heidelberg: Springer.*	2014
5	The Public Procurement of Software: Dialectics in Requirement Specification	Moe, C.E., Sein, M.K. and Newman, M.	Under review with *European Journal of IS*	2015

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Research on Public Procurement of Information Systems: The Need for a Process Approach

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Communications of the Association for Information Systems

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Research on Public Procurement of Information Systems: The Need for a Process Approach

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Abstract:

In this paper, I take stock of the current state of research on public procurement of information systems (IS). Based on a review of the extant literature, I identify several research gaps. A key finding is that little attention has been paid to the process of public procurement, and most of the papers focusing on the process are limited to one specific task, such as tendering and vendor selection. A substantial proportion of these studies are variance or snapshot types. I emphasize the need for more longitudinal research that covers the whole process, and suggest a research approach that focuses on issues such as stakeholder involvement and management, and the application of dialectics.

Keywords: Public Procurement, Procurement Of Information Systems, Acquisition, Purchasing, Buying Behavior, Process Approach.

Volume 34, Article 79, pp. 1391-1335, June 2014

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I. INTRODUCTION

Because few firms and public entities continue to develop their own software, procurement has become the most common way of acquiring information systems (IS). However, procuring these systems is a highly complex process. Information systems encompasses very different types of systems that range from packaged off-the-shelf general office software to specialized systems for niche sectors, such as public social services. Significant challenges arise in procuring the larger and more specialized systems, such as those challenges in specifying requirements before announcing tenders and comparing competing systems. These arise because procuring entities buy items they have not bought before, or at least not in the last 4-5 years. The process carries the risk that procuring entities could specify the wrong features and functionality, and that they could miss new functionality that they may not be aware of. New information systems will influence the work processes and the job content of their users; hence, their input is vital for specifying requirements and selecting the right system. Research on IS procurement could contribute to our knowledge by providing insight on the process of requirement specification, and on users' involvement and management of different stakeholder interests in the procurement process.

The findings of an early review (Thai, 2001) show that public procurement has been a neglected area of study. However, Thai does not refer to any systematic search method or to any selection criteria, and much has happened in the procurement field since the year 2000. Thus, the time has come to take stock of the research on public procurement and to focus specifically on the procurement of IS. Based on a new and more systematic review of the literature, I summarize the previous findings and identify several research gaps. The most important gap is a lack of process approach. I also emphasize that a process approach is crucial for understanding the challenges in public procurement. Others have previously stressed that a process perspective is necessary for understanding and explaining IS development and technological change (Hekkert, Suurs, Negro, Kuhlmann, & Smits, 2007; Lyytinen & Newman, 2008; McLeod & Doolin, 2012).

I further suggest a research agenda that focuses on stakeholder issues, stakeholder management, and dialectics—a set of theories that may contribute to both academia and practice in public IS procurement. The rest of the paper is organized as follows. In Section 2, I define the concept of procurement and its increasing strategic role. In Section 3, I cover the research process and the methodology. In Section 4, I present the review of current research on public procurement of IS, and, in Section 5, I summarize the findings from prior research and suggest a research agenda with associated research questions.

II. THE CONCEPT OF PUBLIC PROCUREMENT

Public procurement is "the acquisition (through buying or purchasing) of goods and services by government or public organizations" (Hommen & Rolfstam, 2009). Some view public procurement as a more extensive process that encompasses purchasing and spans the whole lifecycle from identifying the needs and acquiring goods and services to ending a services contract or disposing an asset (Murray, 2009). In my understanding, public procurement includes formulating business requirements, developing requirements specification, and purchasing, which possibly includes tendering and contract signing, receiving and inspecting the product, and dealing with organizational issues such as stakeholder involvement. This process is subject to both legal requirements and specific policy goals.

Procurement became a more integral part of the public value chain in the 1990s (Lyne, 1996). Around that time, firms started focusing more on their core competencies and outsourcing various activities to their business partners, which led to procurement becoming more strategically important (Rosemann, 2003). A general framework of different procurement strategies for IS was developed (Saarinen & Vepsäläinen, 1994), although the authors who developed the framework found little empirical support for it. The Federal Acquisition Institute of the U.S. Government raised the issue of improving professionalism among procurement personnel (Matthews, 2005) because governments need to operate with efficiency and accountability.

We can categorize procurement into two broad forms: "partnership sourcing" and "adversarial competition" (Parker & Hartley, 1997). Partnership sourcing implies outsourcing work (e.g., systems development on a more or less regular basis to the same vendor). Adversarial competition refers to the rivalry between two or more vendors for a new contract. Private firms may select one or more vendors based on prior relations, or even apply partnership sourcing. This option is not available in the public sector. Due to procurement regulations, tendering is normally required, and this is generally done in the form of an open and transparent process, as in adversarial competition.

In the European Union (EU), two public procurement directives with strong implications are in effect (Costantino, Dotolli, Falagario, & Sciancalepore, 2012). Underlying the E.U. regulations are the principles of transparency and non-discriminatory competition (Cox, 1994). All public procurements above a threshold value should be announced in advance and all vendors should be given the same opportunity. If a procurement contract is expected to be above the E.U. threshold level, a call for tender has to be announced in the E.U. electronic database for tenders (TED). The threshold level has been set at €200,000 for 2013. Some countries have additional national threshold levels (e.g., Norway at NOK500,000, Denmark at DKK500,000), beyond which a call has to be announced in the national database. Even if a public procurement is below this lower level, a procuring entity is obliged to compare prices from different vendors and choose the best offer. In the United States (US), public entities have to comply with the Federal Acquisition Regulation (FAR).

The legal regulations lead to a more complex procurement process in the public sector; however, there are strong motivations for this added complexity. Regulations can prevent corruption in public procurement (Csáki & Gellerí, 2005) by prescribing formal decision processes. Because public procurement involves spending taxpayers' money, doing so efficiently and getting the best possible value for money is a major concern. Public procurements constitute a significant share of the private market for goods and services; hence, business people emphasize the need to provide equal opportunities for competitors. Politicians and citizens are also concerned about the role that public procurement can play in stimulating communities and serving policy goals. Policy making and management influences the procurement process, and policy goals can be in conflict. One conflict is between stimulating the business community in a region and ensuring equal opportunities for all businesses irrespective of where they are located.

The procuring entity also deals with the challenge of satisfying the needs of different stakeholders, which may be in conflict. Information systems normally influence the work processes of many users, who could also have conflicting requirements. This challenge may be tougher in the public sector than in the private sector. Moreover, organizations that are subject to political rather than economic controls are likely to face multiple sources of authority that are potentially conflicting (Boyne, 2002). A good example is the "NHS National Programme for IT in the UK" (BBC, 2009; BCS, 2008; Johnson, 2011), which has experienced a huge overrun in time and costs. This was a highly political project, with many conflicting interests involved. It had a centralized national approach, but with different suppliers involved in an effort to increase competition.

A public entity may face several dilemmas in a procurement process. One such dilemma is the conflict between following the rules and regulations and preferences for a specific software vendor. Another dilemma could be between following the formal rules and regulations and communicating with the different vendors, or further developing the requirements after a tender has been announced in order to procure the best system. In addition, there is the obvious dilemma between price and functionality. All of these dilemmas are further complicated when different stakeholders have different and even conflicting interests. Stakeholders that are involved in the process may have quite different views on what functionality is needed, or they, based on prior experiences, may differ in their viewpoints on specific vendors.

The added issue of different stakeholder interests makes public procurement even more complex. There are also challenges in procuring information systems because quality may be more important than price, and quality is hard to compare when requirements are uncertain. Due to these inherent challenges and due to the added complexity of procurement in the public sector, there is a need for research on the public procurement of IS. In Section 3, I overview how I carried out the research process for this paper, and present the main findings.

III. RESEARCH PROCESS

I conducted a systematic literature review using previously proposed guidelines (Kitchenham, 2004; Kitchenham et al., 2009; Okoli & Schabram, 2010) and adopting the process for literature reviews described by Webster and Watson (2002). I focus on the "procurement of information systems in the public sector", and the unit of analysis is public organizational entities. Few articles have been published specifically on the area of "government procurement of IS" or "public procurement of IS". Hence, my literature search included public and government procurement in general. Some specific challenges in public IS procurement may not be covered by this research, so I also searched for general work on IS procurement. My interest lies in the intersection of public procurement and IS procurement (the shaded area in Figure 1).

Communications of the Association for Information Systems

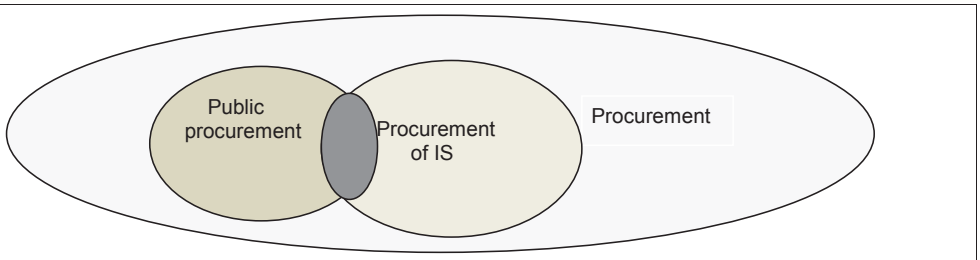

Figure 1. Focus of the Literature Review: Intersection of Public Procurement and IS Procurement

I conducted my search by browsing both library search engines and Google Scholar using a set of keywords[1]. I conducted a systematic search through selected journals in e-government (e.g., *Government Information Quarterly*) and in IS (e.g., *MIS Quarterly*) in issues published from 1992 onwards. After excluding papers based on their quality criteria and relevance, and after carefully reading the abstracts, a total of 138 references remained. I found that the field of procurement and public procurement of IS has been neglected in the IS literature. The majority of journal articles in my data are from non-IS journals, which further underlines the lack of research from the IS community. Of the selected journal papers, only 15 were published in IS journals, and a further seven were published in journals on computer science or computer engineering.

I have used Thai's (2001) "systems view of public procurement" (Figure 2) to organize my findings. The conceptual model was introduced in this paper (Thai, 2001), which has been frequently cited, and it consists of four interrelated boxes. The box entitled "procurement function in operations" represents management and personnel, the organizational structure, and the procurement process, including tools, techniques, and methods.

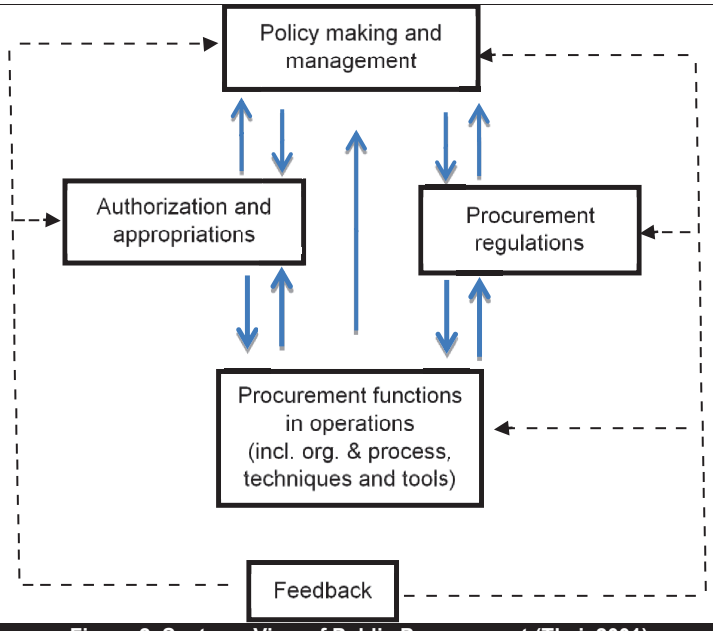

Figure 2. Systems View of Public Procurement (Thai, 2001)

Table 1 summarizes my findings in four main categories. The three first categories are based on Thai's (2001) conceptual model, and the fourth consists of papers that were more general of nature. I categorized my findings in

[1] Details of the full literature review is provided elsewhere, and can be provided by contacting the author.

this way based on carefully reading all of the abstracts. Papers covering the private sector were included in this overview when they cover IS procurement, or when they serve the purpose of covering the actual process.

Table 1: Development of Publication Numbers for Different Topic Areas

		< 2000	2000-2012	Total
Policy making and management		4	25	29 (21%)
Procurement regulations		10	4	14 (10%)
Procurement functions in operations	*Technology for procurement (e-procurement)*	1	26	27
	Organizing procurement	6	19*	25*
	The procurement process	0	24*	24*
	Sum, papers on procurement functions in operations	7	62	69 (50%)
General		6	20	26 (19%)
Number of papers across topic areas		27	111	138 (100%)

* I classify 12 papers in the organizing procurement, 17 papers in the procurement process subcategory in the 2000-2012 period, and seven papers in both subcategories.

As Table 1 shows, the number of publications grew for all topic areas except for procurement regulations. This topic became an important research area when the EU introduced new procurement regulations between 1988 and 1992. Prior practices had led to inefficient and high-cost industries being sustained and to inefficient markets (McGowan, 1991). Martin, Hartley, and Cox (1999) expect that substantial public expenditure savings could be gained by overcoming the protectionist sentiment. In my search, I identified only four papers on procurement regulations published after the turn of the century.

There is a huge increase in publications on the "big box" in Thai's (2001) conceptual model called "procurement functions in operations". However, this box includes managers and procurement personnel, organizational structure, techniques and tools for procurement, and the actual process. It was also described as "the most important and most complicated element of the public procurement system" (Thai, 2001); hence, further examination is needed. By breaking down the procurement in the function box into separate issues, we find that there are only 24 publications covering the actual process. Thai's model places relatively little importance on this issue, which is rather surprising given the complexity of, and the inherent challenges faced in, public procurement. A further examination of the procurement process can highlight what we already know and what questions remain unaddressed.

IV. THE PROCUREMENT PROCESS

In-depth and longitudinal analysis of software procurement has been scarce (Heiskanen, Newman, & Similä, 2000) and, although the number of publications on public procurement has increased considerably, this scarcity still remains. To date, limited work has focused specifically on the process of IS procurement, and surprisingly few systematic studies cover software package procurement (Pollock & Williams, 2007). However, there are a few papers dealing with specific phases and tasks in the process. I will present my findings on the different phases in the process before I look at the procurement process as a whole.

Figure 3 overviews the tasks involved in public procurement under the E.U. directives, without including issues such as who is involved and how the different tasks are carried out. I use this simplified overview to organize the findings of my literature review.

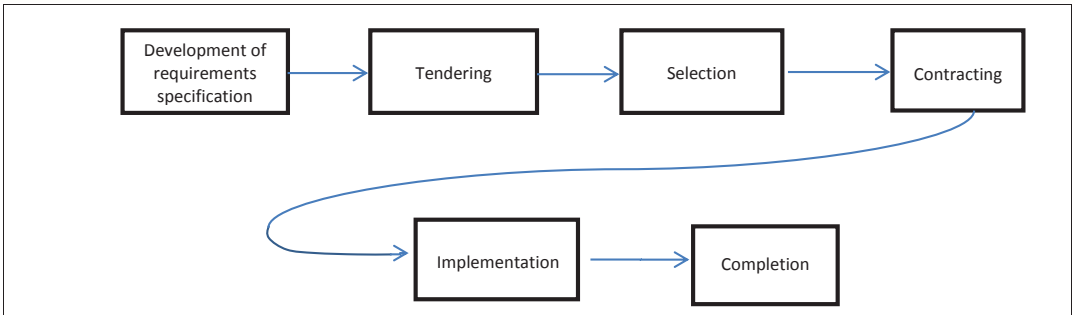

Figure 3. Overview of the Public Procurement Process

When a public entity runs a procurement process, it first has to decide what to procure and how to select the best offer. This step is usually performed in a requirement specification. Based on this, the entity announces a call for tender. The tender is an invitation for businesses to prepare bids and submit them in a certain deadline. For procuring IS, negotiations may be carried out as part of the vendor selection. The negotiations may concern issues such as price, training, implementation schedule, and what add-ons to include. These negotiations may also make it easier to decide whether an offer covers all of the requirements. The winner may be selected on the sole basis of price, or on a combination of price and quality.

When a winner is selected, a contract is signed. The procuring entity notifies all competing vendors, and gives them a period in which to file a complaint if they believe the process has not been in line with the regulations. After this deadline, the contract becomes effective and implementation can start. This phase may include tasks such as making adaptations to the system, tuning the parameters, converting data from the old system, and training the users and support staff. It leads up to the completion phase and final acceptance of the system.

My findings cover research on the development of requests for proposal, tendering, vendor selection (including negotiations), contracting, implementation, and completion. I identified only one paper specifically on requirements specification in procurement, and no papers on implementation or completion of procurement (see Table 2). The distinction between tendering and selection may seem arbitrary because some papers may focus on one of these phases, but have findings that relate also to the other.

The papers referred to in Table 2 differ as to whether they explicitly focus on one phase or cover larger parts of the process. They also differ regarding what research approach they applied, on whether they are purely conceptual or include data collection, and on the context and type of procurement. Of the papers referenced, seven are on public IS procurement (but Table 2 also includes eight papers on IS procurement in the private sector, and nine papers on general public sector procurement due to their relevance for the process issue). Table 2 clearly shows that the focus has been mostly limited to the tendering and selection phases, and indicates that the initial work in forming the project team and specifying requirements, and the subsequent work involved up to completion of the procurement has been largely ignored in prior research.

Table 2: Distribution of Papers Focusing on Specific Phases in the Process of Procurement		
Focus areas	**No.**	
Requirements specification	3	Johannessen, Obstfelder, and Lotherington (2012), Johansson and Lahtinen (2012), Moe, Risband, and Sein (2006)
Tendering	6	Hensher & Stanley (2008)*, Johannessen et al. (2012), Johansson and Lahtinen (2012), Karjalainen and Kemppainen (2008)*, Lawther and Martin (2005), Mateus, Ferreira, and Carreira (2010)*
Selection (including negotiations)	11	Bartle and Korosec (2003)*, Falagario, Sciancalepore, Costantino, and Pietroforte (2011)*, Heiskanen et al. (2000), Hensher and Stanley (2008)*, Howcroft and Light (2002)**, Lian and Laing (2004)*, Lorentziadis (2010)*, McCrudden (2004)*, Moe et al. (2006), Pollock and Williams (2007), Rapscsák, Sági, Tóth, and Kétszeri (2000)
Contracting	2	Banerjee and Duflo (2000) **, Tadelis (2012)*
Implementation	0	
Completion	0	
The whole process of IS procurement	6	Assman and Punter (2004), Dawson, Watson, and Boudreau (2011), Howcroft and Light (2006)**, Poon and Yu (2010)**, Schiessl and Duda (2007)**, Verville and Halingten (2003)**
Total number of papers	24[2]	
Note: * Papers on general public procurement; ** Papers on private sector procurement of IS.		

Findings on the different phases

I present the findings on different phases in more detail in the following sections. Two papers that are not in the review are also discussed (Juristo, Moren, & Silva, 2002; Moe & Päivärinta, 2013) due to their specific relevance.

Requirements Specification

Specifying the requirements is the first formal phase of a procurement project; however, the process itself starts earlier with a growing awareness of the need for a new system. The need can arise for different reasons: the old system may need updating with new functionality or to be integrated with other systems, the vendor of the old system may not support it anymore, or the procuring entity may not have a system at all. The reason for the procurement may affect the complexity of the requirement specification. Vendors may also actually take part in the requirement specification. A case study of the procurement of a laboratory system in a Norwegian hospital (Johannessen et al., 2012) shows how one of the vendors was involved in an innovation project, which later was used as a basis for the requirements specification.

Findings from a Swedish study focusing on requirements specification in IS procurement (Johansson & Lahtinen, 2012) reveals challenges with fuzzy requirements in tender announcements. In particular, there are specific challenges with fuzzy non-functional requirements (such as usability), while hardware requirements are found to be "restrictive". These issues imply the need for more research on this specific phase.

Two case studies in a Norwegian municipality indicate tensions or dilemmas between creating requirements specifications up front or developing the system specification as an integral part of the procurement process (Moe et al., 2006). The latter option would allow for greater learning from the vendors. Another issue that may influence the requirements specification is what Thai (2001) referred to as "policy making and management" (see Figure 3). We may expect tensions or dilemmas between the goal of open and fair competition and applying procurement as an instrument for achieving specific policy goals. Both of these dilemmas require more research.

A Delphi study on the challenges in public IS procurement (Moe & Päivärinta, 2013) may also support the need for more research on requirement engineering, even though the study does not focus on this phase per se. This study shows that chief information officers (CIOs), procurement managers, and vendors experience significant challenges in the requirements specification. While procurement managers and CIOs focus on getting a clear and complete picture of requirements with the necessary details, vendors find requirement specifications too detailed and extensive (Moe & Päivärinta, 2013). Hence, further research is needed on the reasons for this difference in focus, what problems it may lead to, and how to overcome these conflicting concerns.

[2] The sum of the different focus areas is higher (27) than the total number of papers covering the process (24) because some of the papers cover two phases and are included twice.

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Low user involvement has been reported as a problem in requirements engineering in systems development (Juristo et al., 2002), and this finding may also apply to requirement specification in public procurement of IS. To date, this issue has not been covered in research on IS procurement. Thus, research is also needed to understand how to involve important stakeholders efficiently in this phase.

Tendering

The Public Procurements Directive (2004/18/EC Directive) for the EU and the EEA requires public entities to publicly announce their call for tenders for all procurements above a threshold value through the tender electronic database (TED). Similar regulations exist in the US and several other countries. The EU specifies different procedures, such as open tender, restricted tender, negotiated procedure, and competitive dialogue, with minimum time limits for receipt of the tenders and maximum time limits for notice of the results. Six research papers have focused on the tendering phase (see Table 2).

A critical question is whether to announce tenders for all procurements. Both public-private partnerships (PPP) (Lawther & Martin, 2005) and long-term partnerships have been suggested for the public procurement of IS. In competitive tendering, the transaction costs may be high and nullify any financial gains (Hensher & Stanley, 2008). The tendering process in public IS procurements tends to be costly. Contracting authorities are required to publish all tender evaluation criteria and their weights in advance (Mateus et al., 2010). In order to define sound weights, the scoring rules for all evaluation criteria must be defined beforehand, which implies that they are set during the requirements specification. The legislation ensures that more relevant and meaningful information is provided when preparing tenders (Mateus et al., 2010).

More research is warranted on the vendors' work and their challenges in tendering. We have insufficient knowledge about how vendors work to prepare their bids in public procurements of IS. Johannessen et al.'s paper (2012) is one of the few papers that also cover the vendor aspect. They show how a joint effort of innovation between a hospital and a vendor developed into a formal tendering process. The process prohibited all communication between the partners. The paper describes some of the complexity in the process of preparing a bid, which shows that small, innovative firms may lack the capacity to participate in and win tenders. Small- and medium-sized enterprises (SMEs) may also be hindered in the competition due to their lack of legal expertise and administrative resources (Karjalainen & Kemppainen, 2008). A study of tender announcements in Sweden (Johansson & Lahtinen, 2012) found that vendors are often left with the task (and the power) of providing the answers as to whether they meet the functionality requirements. This implies a need for communication between the vendor and the procuring entity after tendering, but prior to final selection. However, the study (Johansson & Lahtinen, 2012) does not show how vendors perform the task of providing the answers. We do not know how the vendors demonstrate that they meet the functionality requirements, and whether the correct answers are provided.

The tendering process is important for vendors, who have to fulfill the task of answering the request for proposals. As the "Requirement Specification" section above shows, the specifications may be fuzzy in some parts and too detailed in others. Communication with the procurer may be stifled, which may result in a far from optimal solution; hence, this process is important for both vendor and procurer. This part of the process seems like a "black box", which requires further research. More research is needed on the interplay and communication between the customer and vendor in the public procurement of IS, specifically during the tendering phase.

Selection

The selection phase starts when procurers receive bids from competing vendors, and involves the actual selection of the supplier. For procurements that require a public announcement of tenders, the selection can be based either on the lowest price or the most economically advantageous tender (MEAT). This combines different criteria, including cost effectiveness, aesthetic characteristic (user interface), and after-sales service. All participants should be informed about the award criteria when the request for a proposal is announced.

Currently, the selection phase is the most researched phase. Table 2 overviews the selected papers. A considerable amount of work focuses on decision criteria and optimal solutions (see, e.g., Falagario et al., 2012; Lorentziadis, 2010). Most of these papers are based on some sort of electronic procurement. Findings from two case studies in a Norwegian municipality suggest that vendor qualifications are important in vendor selection (Moe et al., 2006). Furthermore, a study on private and public purchasing of health services shows that, while prior relations plays an important role in selections in the private sector, the public sector almost exclusively relies on transaction-based methods (Lian & Laing, 2004). Open market competition is used in transaction-based methods, and every procurement should be independent of prior relations and procurements. However, the prevailing regulations do have openings for a more relational selection in the public sector.

Pre-defined criteria should be the basis for selection. The public sector may use procurement to stimulate parts of the business community, and specify criteria to promote this effort. Many states in the US have criteria related to promoting the efforts of small businesses, women, and minorities when choosing contractors (Bartle & Korosec, 2003). McCrudden (2004) has also addressed the complexity of balancing competing goals and the use of purchasing power to advance social justice. Procurers may use a variety of social preferences in vendor selection; this issue is also covered in the subsection on requirements specification.

The complexity of balancing goals may increase when more stakeholders are involved. A case study by Howcroft and Light (2002) on packaged software selection discusses the need for user involvement and for compromises on software functionality. The goal difference between different user groups is a focus in a study on decision-making when choosing a vendor and on insourcing systems development projects (Heiskanen et al., 2000). A normative decision model incorporating both pre-qualification and final selection, and involving multiple stakeholders, has also been suggested (Rapscsák et al., 2000).

One other concern in this phase is the possible information asymmetry between the procurer and vendor. Information asymmetry was found to be prevalent in IS consulting, in a study using the agency theory to identify possible manifestations of opportunism (Dawson et al., 2011). These findings should be of relevance also for IS procurement. Using negotiations as an instrument before choosing the provider is suggested as a guideline (Hensher & Stanley, 2008), and findings from a case study indicate that a negotiated procedure is better suited for IS procurements (Moe et al., 2006). The E.U. regulations actually include tender with negotiations as one of the procedures, and the need for research on if and when this procedure is preferable in public IS procurement is evident. Industry analysts, such as the Gartner Group, are known to influence procurement processes (Pollock & Williams, 2007). Pollock and Williams' study (2007) shows how vendor selection in particular is influenced through market analysis. Further research is needed on the extent to which formal and objective award criteria are applied, and what other criteria play a role in the selection.

Contracting

The contracting phase covers issues such as use of standard contracts, whether to apply a fixed price or a cost-plus price for a scope increase, and how to resolve unclear issues in a contract. One of the challenges in contract issues in IS procurement concerns design uncertainties and how to cover cost overruns. Research findings show that firms with perceived better reputations (Banerjee & Duflo, 2000) have, on average, larger and more complex projects that are harder to design and specify up front. Reputation also matters when using fixed-price or cost-plus contracts (Banerjee & Duflo, 2000). Mathematical modeling and structured interviews with a large sample of Indian software firms form the basis for these findings.

Lessons for public procurement can be drawn based on learning from the construction industry as Tadelis (2012) discusses. The lessons include using cost-plus contracts and selecting a reputable supplier (without competitive bidding) for complex and incompletely specified projects. This contract type results in fewer problems with hidden information at the start of a project because design changes that occur after signing the contract and beginning production are covered. A further issue is the information asymmetry between the procurer and vendor. In their paper covering the whole process, Dawson et al. (2011) present results that apply to contracting. Their model for IS consulting engagements specifies whether a contract should have high or low specificity based on information asymmetry. Transaction costs modeling and the principal-agent theory show that appropriate incentives must be provided for the agent.

Further research is needed on issues such as contract types, and details concerning hidden costs in issues such as training, conversion, and tailoring.

Implementation and completion

As Table 2 shows, I found no study that focuses specifically on implementation or completion of public procurement. However, findings from a case study covering the whole process (including this phase) in the private sector indicate that it can take from three to 12 months to make the selections and up to three years to complete the implementation of ERP systems (Poon & Yu, 2010). This study also shows that corporate governance and more formal project plans might render the procurement process more manageable and shorten the adoption time.

I found one study covering the whole process of procurement of systems development, both in terms of outsourcing and subcontracting software, which may be of specific relevance (Assmann & Punter, 2004). Thei findings in this study support the separation of governance into a distinct phase of its own. The analysis (Assmann & Punter, 2004) also shows the complexity of maintaining communications with subcontractors, and the need to feedback information to the subcontractor. These findings may be relevant for public and private IS procurement in general.

The lack of research on implementation and completion is disturbing because there are bound to be challenges in the transition from procurement selection to adoption. Governing the procurement process and communication between the vendor and procurement entity may prove to be critical in the procurement of complex systems, when requirements are difficult to specify. Thus, more research is warranted on implementation and completion. There is a need to research that tasks comprise these phases, how to organize this work, and whom to involve.

Research covering the whole procurement process

I found six papers that cover the whole procurement process. They identify several critical success factors in procurement of ERP systems (Poon & Yu, 2010), including adopting a stakeholder approach when forming the acquisition team, and involving people with prior knowledge of the system type. A stage model of the procurement process for ERP software has been developed based on data from four cases (Verville & Halingten, 2003); however, this model ends with the negotiation phase.

A paper covering the whole process (Assman & Punter, 2004) suggests a model for subcontracting software development). This study views the subcontracting or acquisition as a process involving tendering and selection, monitoring, and completion at the end of a product's life span. However, Assman and Punter (2004) focus on the selection phase. They view specifying requirements as critical, and expect requirements to change. They also consider user involvement to be essential.

Theories on power has been applied as a theoretical lens in a study of procurement of a CRM system for a research and consulting firm(Howcroft & Light, 2006). The users of the CRM-system were involved at a rather late stage in the procurement process and the paper shows how power was applied when user resistance emerged. The study further shows how the process goes far beyond selection because the selected vendor may not be able to meet the final requirements.

The role and involvement of different users may vary among countries. A study of software procurement in the private sector in four different European countries revealed that the higher levels of the hierarchy at the customer side are involved in almost every stage of the process in Germany and Switzerland, possibly due to a need for control (Schiessl & Duda, 2007). In Spain and Belgium, however, the management team delegated more, and were less involved in the later phases of procurement.

In their study of information asymmetry in IS consulting, Dawson et al. (2011) found "numerous" instances of what they term signaling and screening during different phases of the process (i.e., prior to putting in bids for the consultant, prior to customer selecting consultant, and during the engagement). In signaling the party with the information advantage conveys meaningful information about itself to the other party, often in hope of achieving a sale or a higher price. Screening is applied by a party who lacks suitable information, to learn about the suitability of the other party. Both client and consultant opportunism was reported to be frequent by the respondents, and Dawson et al. suggest applying for different constraints in the contract (see the "contracting" section).

This study's findings (see Table 2) highlight some of the complexity of IS procurement, and the need to involve different stakeholders and to have a process focus when researching IS procurement. The issue of stakeholder involvement is complex and requires more research on how to involve stakeholders and how to deal with conflicts of interests and different policy goals. The involvement of users from different functional areas has been found to be necessary (Poon & Yu, 2010; Verville & Halingten, 2003). A paper on the difference between the public and private sector (Boyne, 2002) highlights the potential for conflicting interests between different stakeholders, which necessitates stakeholder management.

However, the majority of research publications covering the whole process focus on private sector procurement of IS. Only one of the 24 papers I identified cover the whole process of public procurement of IS (Dawson et al., 2011) (see Table 3). However, I do not focus on the procurement of systems per se, but on IS consulting services.

Table 3: Number of Research Articles with a Process Focus Covering a Single Phase, and the Whole Process

Coverage	Private procurement in general	Private procurement of IS	Public procurement of IS	Process papers in total
Single phase	6	3	7	16
Complete process	1	6	1	6
Sum	7	9	8	24

I now examine the research design applied in the studies that I have identified as having a process focus (see Table 3). This shows what methods and approaches have been applied in papers covering the procurement process, an,d hence, what approaches should be considered in future research.

Research design for articles on the procurement process

Surprisingly, only five of the papers with a process focus on IS procurement actually rely on empirical data from public procurement processes. Table 4 presents the research design and Table 5 shows the period of data collection for all 24 process papers. Very few articles containing quantitative data are available. We can also see that few longitudinal studies have been published and only one has data from multiple cases.

Table 4: Research Design used for Process Papers

Research design	No.	Percent	Reference
Survey	3	13 %	Bannerjee and Duflo (2000), Bartle and Korosec (2003), Karjalainen and Kemppainen (2008)
Action research (AR)	2	8 %	Howcroft and Light (2002, 2006)
Interpretive studies	10	42 %	Dawson et al. (2011), Heiskanen et al. (2000), Johannesen et al. (2012), Johansson and Lahtinen (2012), Lawther and Martin (2005), Lian and Laing (2004), Moe et al. (2006), Pollock and Williams (2007), Poon and Yu (2010), Vervile and Halingten (2003)
Mathematical modeling	6	25 %	Falagario et al. (2011), Hensher and Stanley (2008), Lorentiziadis (2010), Mateus et al. (2010), Rapscsák (2000), Tadelis (2012)
Modeling, literature study	3	13 %	Assman and Punter (2004), Schiessl and Duda (2007), McCrudden (2004)
Sum	24	100 %	

Close to half of the papers apply interpretive studies; two apply action research, and only three are based on surveys. However, a closer look at the interpretive studies reveals that most are based on single interviews of different stakeholders after a project is finished, and only five can be classified as truly longitudinal, with data collection being carried out at different intervals during the process.

Table 5: Period of Data Collection

Time period	No.	Percent
No data collection	7	29 %
Single snapshot	9	38 %
Longitudinal	4	17 %
Longitudinal, multiple cases	4	17 %
Total	24	101 %

A closer look at the papers involving data collection shows us that less than a third of the studies apply some type of theory in their analysis of findings (see Table 6 below for an overview).

Table 6: Theories applied

Dawson et. al. (2011)	Agency theory (se e.g., Eisenhardt, 1989))
Heiskanen et al. (2000)	Transaction Cost analysis (see, e.g., Williamson, 1991))
	Saarinen and Vepsalainen's (1994) framework of procurement strategies
	The model of user – developer interaction (Newman & Robey, 1992)
Howcroft (2002, 2006)	Lukes' three-dimensional view of power (Lukes, 1974)
	The concept of professional power (Markus & Bjørn-Andersen, 1987)
Johannessen et al. (2012)	Infrastructuring (see, e.g., Nilsen, 2006))
Lian and Laing (2004)	Transactional based (Campbell, 1985) and relational based paradigms (Ford, 2002)
Pollock and Williams (2007)	Theory on decision making (Tierney & Williams, 1990)
Verville and Halingten (2003)	Organizational Buying Behavior (see, e.g., Geisler & Hoang, 1992))

Based on this overview, I stress the need for more interpretive longitudinal studies using a process approach, and for more application of relevant theories.

V. SUMMING UP AND FURTHER WORK

This study's findings highlight the complexity of the process used in public procurement of IS. We see that there are challenges with developing clear, but not too detailed, requirements. We further see that there are dilemmas between specifying the requirements up front, and doing the system specification as an integral part of the procurement process. The findings also show that vendors are left with the task and power of providing the answers to whether they meet the requirements, and communication is prohibited between public procuring entities and vendors. User involvement is highlighted, but goal difference between different stakeholders is a challenge. The process is lengthy and is not over before the systems procured are implemented and the procuring entities acknowledge the contract as fulfilled.

However, we also see that a limited body of research exists on procurement and specific tasks in the process. Based on my findings, I identify major gaps in the prior research on public procurement of IS in both content and in methodology. Content-wise, there are a number of unanswered research questions regarding the whole procurement process. Methodology-wise, there is a lack of longitudinal studies that use a process approach. These gaps are elaborated below.

Content gap

More research is required on all phases of the public procurement process. Table 7 presents several research topics and questions related to the procurement process that need to be addressed. For some of the phases, these questions are quite concrete, but other phases have barely been studied. Each phase may take long time and can be understood as a process in itself. We lack research findings for the phase termed "implementation and completion"; hence, we need to open the black box to understand what actually goes on, what the challenges are, how they are met, and what further challenges these issues may lead to. Only after opening the black box can we know what questions to address.

Table 7: Overview of Areas for Further Research on The Procurement Process

Focus area	Research questions/topics
Requirements specification	What problems may the difference in focus between the two stakeholders, the procurer and vendor, lead to? How can this difference in focus be overcome? How are, and how should end users be involved in the requirement specification? How do different stakeholders' goals influence the requirements? How can policy goals be included in the requirements of public procurement of IS?
Tendering	"Opening the black box" of what goes on at the vendor side When to choose the different procedures (open tender, restricted tender, tender with negotiations and competitive dialogue), and how does this choice influence the process?
Selection	Use of negotiations as part of the process of vendor selection How can procuring entities solve the dilemma between applying policy goals and keeping in line with procurement regulations?
Contracting	Dilemmas between the vendors' interests and procuring entities' interests in contracts Issues concerning hidden costs (e.g., training, conversion, tailoring)
Implementation and completion	Challenges in the implementation process and in completion of IS procurement projects
The whole process	How are the different procedures (tender, tender with negotiations, and competitive dialogue) best carried out? How do different stakeholders play out their policy interests throughout the process? How can different stakeholders and their interests be managed throughout the process?

More research on the requirements specification in public procurement of IS is also needed. When researching the tendering phase, we need to focus more on the vendor side. It would be useful to study how vendors, and especially SMEs, work to meet tenders for public procurements. One related research area that should be covered is when the different procedures specified in the E.U. regulations (open tender, closed tender, competitive dialogue) should be chosen, and how they are best carried out. These questions are of special interest for competitive dialogue, which is

a new instrument, and which is used to a lesser extent than the other procedures. We also need to study the need for communication beyond the formal announcement of a tender between procuring entities and vendors during requirements specification, selection, and implementation.

Several of the questions relate to different stakeholders (e.g., procuring entity and vendor in contracting) and to dilemmas between different interests (e.g., policy goals and procurement regulations). Research on how different stakeholders play out their interests throughout the process and how to manage these interests, which may prove to be conflicting, is needed.

Methodology gap

Just as important as the research topics is the need for a research approach that matches the research agenda. More studies with a process focus are required, as are more longitudinal studies on the process as a whole. Generally, a lack of focus on process is evident because much of the work is conceptual, analytical, or based on mathematical modeling. Thus, there is a need for a holistic view, for studying public procurement of IS as a process rather than as a sequence of actions. This could prove to be just as crucial as process perspective is in understanding and explaining IS development and technological change (Hekkert et al., 2007; Lyytinen & Newman, 2008; McLeod & Doolin, 2012).

In their case study on technology choice, Pollock and Williams (2007) show that a procurement team may face arguments that come from outside the team's boundaries and they may face controversies. The process of public procurement may not be altogether rational, and, if we limit our research to factor studies of specific decisions, we risk losing much of the story of how and why particular outcomes are attained. Progress in the field will demand process studies (van de Ven, 2007), but process theories and variance theories are not mutually exclusive and should be combined (van de Ven & Poole, 2005).

Newman and Robey's social process approach for research in IS (Newman & Robey, 1992; Robey & Newman, 1996) may prove to be useful. This approach may help explain much of what actually goes on during a procurement process, and hence help in understanding the outcomes. One way of analyzing a process could be through punctuated process modeling (Newman & Zhu, 2009) and by identifying critical incidents, which are incidents that prove difficult or involve conflict to some degree and which can change the outcome of a project. By performing such an analysis, we may be able to identify the interests of different stakeholders and see how they interplay. Moreover, we may be able to identify what actually shapes a process.

A true process approach requires longitudinal data collection from different stakeholders that are involved in public IS procurement projects. We need data from the different stakeholders at different points in time, both during the projects, and after their completion. Data from different events, possibly through first-hand observation, is also required. These data can be analyzed by applying theories such as stakeholder management and dialectics. A longitudinal study is needed to provide these insights.

Research issues in public procurement in general

Beyond the specific gaps described above, research issues also emerge for the broader area of public procurement of IS. More research is needed on issues such as the dilemma between adhering to procurement regulations and applying specific social goals. We do not know to what extent the regulations may open up for applying specific policy goals. We also need to focus more research on how public authorities can apply policy goals and how they influence different phases of the process, especially the requirements specification. In addition, research is vital on how public authorities can apply policy goals and still keep in line with public procurement regulations of transparent and non-exclusive award criteria.

Thai's model (2001) (Figure 3) needs updating. My findings indicate that the processual aspect is of specific importance in public procurement of IS, and we might need a specific model for IS procurement in the public sector. A new model should open up the box termed procurement functions in operations and split it into a separate box for processes and one or more for the other issues (organization, tools, and techniques). Thai's model is a conceptual model, and, by incorporating a separate box for the process, we are developing it into a processual model. That implies a need for research on the links between the process and the other factors, and we need to understand the causal relationships.

I suggest that we need a multiple longitudinal case study on the public procurement of IS covering procurement processes from the start until the systems have been implemented and the procuring entities have accepted that the contract has been fulfilled. Data should be collected through interviews, observations, and project documents. This could open up the black box of some of the phases and answer some of the questions presented in Table 7. I further

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suggest that we need to focus on the dilemmas between policy goals and regulations and between the norm of open transparent competition and the goal of procuring the best possible system, whatever that is. In such studies, theories on stakeholder analysis and management and institutional theory could be applied as theoretical lenses.

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Editor's Note: The following reference list contains hyperlinks to World Wide Web pages. Readers who have the ability to access the Web directly from their word processor or are reading the paper on the Web, can gain direct access to these linked references. Readers are warned, however, that:

1. These links existed as of the date of publication but are not guaranteed to be working thereafter.
2. The contents of Web pages may change over time. Where version information is provided in the References, different versions may not contain the information or the conclusions referenced.
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Challenges In Information Systems Procurement in the Public Sector

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Abstract. Public procurement constitutes a large part of the market in many countries, and it has the potential of playing an important role in stimulating communities and serving policy goals. With this in mind the governments have set regulations for public procurement. Procurement of Information Systems is especially challenging due to the complexity of procuring unknown technology and the importance an information system has for different stakeholders in an organization. Public procurement of information systems (IS) and services provides several challenges to the stakeholders involved in the procurement processes. However, these are not well established or understood, and there is a knowledge gap that needs to be covered. This paper presents results from a Delphi study, which involved 46 experienced procurement managers, chief information officers, and vendor representatives in the Norwegian public sector. The participants identified 98 challenges related to IS procurement, and subsequently ranked the relative importance of the top issues. The study supports findings from previous research related to diverging stakeholder goals; challenges in balancing between objectives; in requirement specifications; and in too narrow cost focus. In addition to providing empirical confirmation of these previous propositions the study revealed new findings, such as benefits realization in IS procurement; coordinating and standardizing public procurement processes; complex and constraining government regulations; issues of technological integration and compatibility; and inter-municipal cooperation. Developing clear requirements specifications stands out as critical for public sector officials. The results provide a rich overview of IS procurement challenges in the public sector in Norway, and may also give a good picture of challenges in other countries with similar procurement regulations.

Keywords: Public procurement, procurement of information systems, procurement challenges, stakeholder challenges, Delphi study

1 Introduction

Public procurement has been defined as "acquisition (through buying or purchasing) of goods and services by government or public organizations" (Hommen & Rolfstam, 2009, p. 20). It involves significant investments, and plays a major role in the marketplace. Public procurement became more strategic in the 1990s, as it became more common for services to be delivered by contract than through direct employment (Lyne, 1996). The strategic importance of procurement also increases as companies focus on their core competencies and transfer activities to their business partners through outsourcing (Rosemann, 2003).

Procurement of information systems (IS) and related services is challenging compared to acquisition of more standardized goods and services. Information systems often need to be customized to the needs of the public sector (Keiichiro & Hajime, 2005). Procurement decisions are made early in the procurement process, when requirements are still uncertain (Saarinen & Vepsäläinen, 1994). The buyer may have to compare between competing, complex system options. Information systems can support this process (Davila et al., 2003), but research shows difficulties in implementing e-procurement in the public sector (Henriksen & Mahnke, 2005). Furthermore e-procurement offers limited support in the process focusing mainly on the selection of vendors, but less on other parts of the process such as requirements specification, negotiations and contract monitoring.

Our research focuses on information systems that are implemented for specific organizational purposes, such as enterprise resource planning systems and e-services tailored for the buyer's needs. We thus exclude acquisition of off-the-shelf software from this study. Outsourcing of IS development is a relevant issue in our research context, as complex systems often require customization and involve contracting with a vendor to tailor an existing information system or develop a new system altogether.

The public sector also faces slightly different challenges from the private sector. It is often bound by strict regulations concerning procurement and public tendering. For example, most European countries are required to publicly announce a call for tender for all procurements above a certain threshold value. This applies to

member states in the European Union (EU) and in the European Economic area (EEA). In addition, public projects are often large in terms of scope and of volume, which makes them risky. There are several incidents of significant overruns in time and costs, such as the Norwegian Golf defense project (Riksrevisjonen, 2008) or the National Health Service Program for IT in England (Johnson, 2011). The public procurement process is in itself challenging, as is the complexity of procuring new or unknown technology. However, these challenges are not well researched and we seek to fill this gap.

Our research question concerns the challenges and dilemmas that are typically faced in procurement of information systems and related services in the public sector. We carried out a Delphi study with three expert panels related to IS procurement in the Norwegian public sector: procurement managers, chief information officers (CIOs), and vendor representatives. We chose to have three panels because we expected that different stakeholders might differ in their views on the challenges. The expert panels identified and ranked challenges faced in IS procurement in the public sector. Our discussion of the most important challenges contributes to the research literature by confirming some previously identified findings, as well as identifying additional issues that need attention in order to improve public IS procurement.

The rest of the article is structured as follows. Section 2 gives an overview of previous research on public procurement and procurement of IS with a focus on IS procurement challenges previously identified. Section 3 describes the research process. Section 4 summarizes our results and section 5 discusses these in light of the previous research. Section 6 concludes with suggestions for further research.

2 Previous research

Public procurement of Information Systems has gained little attention from researchers, but some of the previous work on public procurement in general carries relevance for our research question. This is introduced below. We summarize also challenges specific to procurement of Information Systems, and provide an overview of the previous literature in table 1 at the end of this section.

2.1 Public procurement

Public procurement can be viewed as a system in action (Thai, 2001) consisting of policy making and management, procurement regulations, authorization and appropriations, and procurement functions in operations. An important line of research has been on management and implementation of procurement policies (Bartle & Korosec, 2003; McCrudden, 2004; Murray, 2001). A common focus of this research is on whether and how procurement can be used as an instrument for specific policies, such as stimulating innovation or development of green products. The research on implementation of the regulations in the public sector also covers the aspect of partnerships with vendors (Gelderman et al., 2006; Martin et al., 1999). These research areas cover public procurement in general and are of relevance to public procurement of IS.

The most complicated element of the system is what Thai (2001) terms “procurement functions in operations”, which includes organizational structure and techniques and methods for the procurement process. A literature review carried out by one of the authors [currently unpublished], shows that there is limited work on this issue in the public sector. Most of this work is on the early phases of the procurement process, such as tendering and vendor selection. The literature review shows that there is less work on contracting, governance, and process focus on public procurement.

One of the previously identified challenges concerns the issue of various internal stakeholders with conflicting goals. Organizational buying involves multiple participants in a process (Wind & Thomas, 2001) where many purchasing decisions are influenced by various members of the buying center (Spekman & Stern, 1979). In addition, the public sector involves the complexity of satisfying needs of different stakeholders. The main distinction between public and private organizations resides in ownership; public agencies are owned collectively by members of political communities, whereas a limited group of entrepreneurs or shareholders owns a private business (Boyne, 2002).

One line of previous work has focused on the challenges of conflicting goals in public procurement. Public procurement must deal with a broad range of issues (Thai, 2006):

- Balancing the dynamic tension between a) competing socioeconomic objectives and b) national economic interests and global competition as required by regional and international trade agreements;

- Satisfying the requirements of fairness, equity, and transparency; and
- Maintaining an overarching focus on maximizing competition.

Thai (ibid.) provides little empirical evidence for this need to balance goals. However, a survey of state procurement and contracting in United States found that a variety of social preferences are used in vendor selection (Bartle & Korosec, 2003); more than half of the sample preferred businesses based in their own state, and some had set-asides for minorities and women-owned businesses. An analysis from Northern-Ireland also provides some support, indicating that public procurement comprises regulatory, commercial and socio-economic goals, and that these are possible to balance (Erridge, 2007).

2.2 Procurement of information systems

There is also the issue of information asymmetry when procuring services from IS consultants (Dawson et al., 2011). Agency theory suggests contracts and monitoring of the work to limit opportunism from a vendor, but this may not be sufficient to cope with the problem as consultants have more knowledge of the problem area than the procurement entity. The challenge of consultant opportunism comes in addition to the challenge of competing interests from internal stakeholders and may necessitate a complex set of strategies.

Findings from public sector IS procurement indicate that regulations and contract arrangements are protective of the government customer, through particular payment models (Doshi, 2005) and use of standard government contracts (Moe et al., 2006). This may limit vendors' interest in participating in public tenders, and less competition may lead to buyers having little choice and less bargaining power.

The contemporary literature on IS procurement challenges and public procurement remains largely without an established theoretical base and there is limited empirical data to validate the conceptual and normative recommendations. The literature identifies a number of potential challenges, but there is little systematic research on additional challenges in public IS procurement. A study of 4 ERP procurements in private sector shows the importance of adopting a stakeholder approach (Poon & Yu, 2010). The challenge of different stakeholders may be more important in the public sector than in private sector, but there is limited research on how it interplays with other challenges. The main findings from previous research on challenges related to public procurement and procurement of Information Systems are summed up in in Table 1. The table further shows the research approach and the analytical lens for these studies.

Table 1: Summary of findings from previous research on public procurement and procurement of IS

Challenge	Proposition	Type of study	Theory
Various internal stakeholders Public agencies face a variety of stakeholders, placing demands and constraints on managers (Boyne 2002)	Demands and constraints from different stakeholders may be in conflict	Literature review	Stakeholder theory
Gaps between project goals and stakeholder goals, both internal and external (Pan 2005)	Underestimation of stake-holder groups may lead to problems in terms of resistance	Case study of development of information system (for e-procurement	
Governance of procurement processes over time (Poon & Yu, 2010)	Adopting a stakeholder approach and preparing evaluation criteria are critical success factors	Case study of 4 ERP procurements in private companies	Micro-politics
Information asymmetry (Dawson et al., 2011)	Consultants are difficult to control through contracts due to information asymmetry; there are more opportunities for opportunism	Interviews with 15 experienced IS consultants and procurers	Agency theory, principal-professional lens

Challenge	Proposition	Type of study	Theory
Limited interest from vendors, due to payment model and standard government contracts	Not enough competition, and the buyer may not be able to get optimal price or quality	Analysis of guidance and model contracts for UK government IT projects (Doshi, 2005) Case study of two public IS procurements (Moe et al., 2006)	No specific theory
Public procurement balances between socio-economic objectives (Thai, 2001) Public entities have more ambiguous goals Local vendors and vendors representing minorities may be favored	This may create dilemmas between conflicting goals	Subsequent research supports Thais (2001) claim. Boyne (2002) finds support for ambiguous goals in literature review Bartle and Korosec (2003) find that social preferences are used by American state governments	Conflicting goals; these conflicts can be between different stakeholders
Specifying requirements before announcing tender Information Systems may have ill-defined scope and unclear requirements	The requirement may ask for the wrong system	Case study of two public IS procurements (Moe et al., 2006) Findings from two cases indicate that partnership may be better suited to complex procurements (Lawther & Martin, 2005)	None
Focusing on lifecycle cost and not just initial procurement costs	If managers do not adopt a long-term perspective for valuation, they may end up with higher lifecycle costs	Survey from materials procurement in Norwegian Army (Tysseland, 2008)	Agency theory, information asymmetry, project uncertainty

We saw a need for research to identify and prioritize the challenges and assess how they are related. We chose the Delphi method for our research, this can be used to develop an overview of what challenges and problems are most prominent in a field (Okoli & Pawlowski, 2004). In this context, the challenges represent factors that may have negative impact on the success of a procurement process and in the resulting system.

3 Research method

We chose to follow the process steps recommended for ranking-type Delphi studies (Okoli & Pawlowski, 2004; Schmidt, 1997) in order to identify, select, and rank the observed problems and challenges.

The Delphi method is useful in complex, immature fields involving expert judgment (Gupta & Clarke, 1996; Rowe & Wright, 1999). It fits especially well in situations where the experts are geographically scattered (ibid.). The method formalizes communications between researchers and experts in order to extract unbiased information based on the experts' opinions. The key features that characterize the Delphi method are anonymity, multiple iterations, controlled feedback, and statistical aggregation of the group response (Rowe & Wright, 1999). Potential disadvantages include lengthy process, potential researcher influence on responses based on formulation of the questions, and difficulties due to the fact that the experts never meet in person (Murry & Hammons, 1995).

3.1 Composition of the expert panels

First we selected the experts for the study. We limited ourselves to inviting practitioners only, from different types of public entities of a reasonable size (municipalities, government-run entities such as hospitals, and entities in central government). We also selected experts from vendors who provide systems and services to the public sector and have a considerable portion of this market. Our design involved three expert panels:

procurement managers, chief information officers (CIOs), and representatives of vendors. While we considered involving politicians (representing citizens in public organizations) and end-users, we soon realized that these stakeholders were less involved in the actual procurement processes.

We required our experts to have minimum three years of experience in their current position or in a similar position, with procurement responsibility (or sales in the case of vendors). We also required experience from minimum three procurement processes of information systems or services in the public sector. We contacted the experts, whom we knew from previous projects or through professional networks by e-mail and phone, inviting them to participate and explaining the purpose and process of our research. We further asked them to nominate other experts who satisfied our selection criteria, and we contacted the largest municipalities in the country.

The procurement manager panel included 18 participants, the CIO panel 17 participants, and the vendor panel 11 participants. Most of the CIOs and procurers came from municipalities (28); the remainder worked in health care organizations, regional public administration, or state government. The vendor experts were from consultancies, software houses offering niche systems (e.g. systems for social services); or general software houses.

3.2 Data collection and analysis

We divided the data collection process into three phases: brainstorming, narrowing-down, and ranking, as recommended by Schmidt (1997) and Okoli & Pawlowski (2004).

3.2.1 Brainstorming

In the first phase we brainstormed issues related to the research question. We sent a welcome letter to the participants by e-mail. Each expert was asked to list at least six challenges for or dilemmas of public IS procurement. We asked them to give each challenge a name, a definition, the causes for each challenge and the consequences that would occur if they were not managed. By answering this, the experts gave a structured explanation of each challenge. For example, one challenge is writing clear requirements specifications. One CIO explained that this was due to the strict requirements for tender format and the low threshold for official complaints. This could lead to the vendors taking advantages of shortcomings in the specification, and to the procuring entity ending up with making the wrong choices. One of the procurement managers explained that the challenge was caused by a lack of holistic understanding of the business processes, and this could lead to a lot of change orders and to procurement of modules that are not implemented.

The experts e-mailed their lists to us directly, thus remaining anonymous to each other. After collecting the replies, we combined the issues into a single list, removed exact duplicates, and unified terminology. We collated the responses independently, before comparing and consolidating the individually constructed lists. We sent our consolidated list of 96 challenges back to the experts to ensure we had not eliminated any challenges in this phase and that we had not misinterpreted any issues. This step resulted in the addition of two more items. The entire consolidated list of 98 challenges and dilemmas from the brainstorming is presented in Appendix A.

3.2.2 Narrowing down the results

In the second phase we narrowed the list down to a manageable number of the most important issues. In each panel, each expert defined around 20 issues that they considered the most important. The presentation order of the full list of issues was randomized to avoid bias in selection of the most important challenges, based on a factor's sequence in the list.

This phase resulted in a list of 19 issues, which were selected as follows. First, we selected a "top ten" list based on the votes in total across the three panels. This resulted in 13 challenges in total, as the challenges ranked from 10 to 13 got the same number of votes. Then we checked whether there were large differences between the panel selections. Kendall's tau (a measure to study ranking correlations between different panels) values showed some correlations between the panels selections for the narrowed-down lists. However, all the correlations were less than 0.5 (Table 2), and values below this threshold is a sign of two rankings not being relatively similar. So we decided to include challenges chosen by more than 50% (Schmidt, 1997) of members

in each particular panel. This step assured that each panel had its challenges represented in the narrowed-down list. It resulted in six additional challenges to be included for further analysis, giving a total of 19 in the list.

3.2.3 Ranking

In the third phase the relative importance of the top 19 issues were ranked. Since the Kendall's tau values between all the pairs of the panels were below 0.5, we chose to do the ranking separately for all the three panels. By dividing the experts into three separate panels, we expected to reveal potential differences in challenges between these three stakeholder groups.

The third phase was carried out in two rounds. In Delphi studies, the number of ranking rounds should depend on whether each panel reaches either an acceptable level of consensus or a state where the level of consensus stagnates. Kendall's coefficient of concordance (*W*) was used to measure the level of consensus within each of the panels.

The results from the first round of ranking were fed back to the panel members. They were asked to reflect on their ranking compared to the group's average, and then re-rank the challenges. Kendall's tau values on the first ranking round (Table 2) showed some interesting results. While the top issues from the narrowing-down phase correlated between all panels to some extent, the dissensus between the vendor panel and the two other panels increased after the ranking rounds. The vendors' selection did not correlate significantly with the two other groups. The procurers' and CIOs' rankings continued to correlate, however some factors were very differently valued by the two panels. Hence, a panel-wise discussion and comparison of the ranking results is legitimate.

Schmidt (1997) recommends a concordance level of $W = 0.7$ to indicate a high level of agreement among the respondents in each panel. Ideally, the ranking rounds should continue either until that level is reached, till the concordance level does not increase further between two consecutive ranking rounds, or till one more round is no longer considered feasible (Schmidt, 1997). We decided to stop ranking after two rounds, due to several indications that the panel members were not willing to participate in more rounds. We had to send several reminders on the second round, and expected to lose more panel members if we continued one more round. One representative of the vendor group had dropped out of the study between the first two rounds, and more dropouts would have weakened the reliability of yet another ranking. We had gained a moderate consensus ($W > 0.5$) in two of the groups (procurement managers and vendors), whereas the CIO group consensus was low ($W > 0.3$) to moderate (Tables 3-5). The biggest relative changes within each panel were maximally two positions up or down, so we are confident our results correctly ranks the issues most important to the panelists.

Table 2: Kendall's tau values between the three panels

	Procurers*CIOs	Procurers*Vendors	CIOs*Vendors
Narrowing-down phase (all 98 items)	0.474 (sig. 0.000)	0.205 (sig. 0.006)	0.234 (sig. 0.004)
Ranking round 1 (top 19 items)	0.471 (sig. 0.002)	-0.106 (sig. 0.585)	-0.076 (sig. 0.710)
Ranking round 2 (top 19 items)	0.450 (sig. 0.008)	-0.112 (sig. 0.584)	-0.088 (sig. 0.681)

4 Results

The following tables present challenge rankings after the first and second round for each of the three panels. There were some minor changes in the ranking order between the first and second round, but overall the top-ranked challenges had a higher score (closer to 1), and the lower-ranked challenges had a lower score (closer to 19) in the second round.

As the results in tables 3-5 below show, the three groups ranked challenges somewhat differently. "Change of work processes and benefits realization" was ranked as the most important challenge by procuring officers, with an average ranking of 2.2. CIOs ranked "Clear requirements specification" as the most important

challenge, with an average ranking of 4.3. This challenge was not considered much more important than the next two challenges. "Finding and using good assessment criteria" received an average ranking of 4.5, and "Integration, compatibility" received an average ranking of 4.6 from the CIO´s. Vendor representatives differed from these two groups, ranking "Too much focus on costs" as the most important challenge with an average of 2.0.

Table 3: Ranking results: Procurement managers

Challenge		Mean ranks	
Rank	Issue	Round 1 (N=18)	Round 2 (N=18)
1.	Change of work processes and benefits realization	5.0	2.2
2.	Clear requirements specification	7.1	4.7
3.	Integration, compatibility	7.9	5.1
4.	Lack of coordination and standardization	8.1	6.1
5.	Weighing / prioritizing the assessment criteria	8.2	6.4
6.	Complete requirements	8.7	7.6
7.	Frame agreements	9.5	7.9
8.	Procurement competence	8.9	8.4
9.	Cooperation between different stakeholders	10.1	8.8
10.	Tendering obligations may conflict with long-term planning	10.1	10.6
11.	Monopoly-resembling vendor conditions	10.3	11.2
12.	Too much focus on costs	10.6	11.3
13.	Municipal cooperation is challenging	11.0	11.7
14.	Finding and using suitable assessment criteria	11.0	12.5
15.	Partnership and innovation are hindered	11.2	13.3
16.	Complex regulations	12.6	14.9
17.	Vendors tend to oversell	12.7	15.0
18.	The vendors don't get to show their qualities	14.1	15.4
19.	Feasible requirements	13.0	15.7
	Kendall's *W*	0.160	0.537

Table 4: Ranking results: CIOs

Challenges		Mean ranks	
Rank	Issue	Round 1 (N=17)	Round 2 (N=17)
1.	Clear requirements specification	6.4	4.3
2.	Finding and using good assessment criteria	6.5	4.5
3.	Integration, compatibility	5.1	4.6
4.	Lack of coordination and standardization	8.2	7.4
5.	Weighing / prioritizing the assessment criteria	8.9	7.8
6.	Partnership and innovation are hindered	8.4	8.2
7.	Change of work processes and benefits realization	7.5	8.5
8.	Too much focus on costs	8.3	9.3
9.	Tendering obligations may conflict with long-term planning	9.8	9.5
10.	Complex regulations	9.8	9.6
11.	Frame agreements	9.3	9.8
12.	Cooperation between different stakeholders	10.1	10.4
13.	Procurement competence	11.0	11.1
14.	Complete requirements	12.2	12.2
15.	Municipal cooperation is challenging	11.2	12.5
16.	Vendors tend to oversell	12.8	13.8
17.	Monopoly-resembling vendor conditions	13.3	14.4
18.	The vendors don't get to show their qualities	15.5	15.9
19.	Feasible requirements	15.6	16.2
	Kendall's *W*	0.268	0.391

Table 5: Ranking results: Vendors

Challenges		Mean ranks	
Rank	Issue	Round 1 (N=11)	Round 2 (N=10)
1.	Too much focus on costs	2.7	2.0
2.	Feasible requirements	6.5	5.0
3.	The vendors don't get to show their qualities	6.5	5.1
4.	Change of work processes and benefits realization	6.6	5.5
5.	Cooperation between different stakeholders	7.3	6.0
6.	Partnership and innovation are hindered	9.0	7.8
6.	Complex regulations	8.5	7.8
8.	Procurement competence	8.8	8.6
9.	Weighing / prioritizing the assessment criteria	9.1	8.7
10.	Tendering obligations may conflict with long-term planning	9.6	10.2
11.	Lack of coordination and standardization	10.7	11.0
12.	Clear requirements specification	10.8	11.1
13.	Complete requirements	11.4	11.9
14.	Frame agreements	12.3	13.3
15.	Municipal cooperation is challenging	11.8	14.0
16.	Finding and using suitable assessment criteria	14.7	15.0
16.	Integration, compatibility	13.4	15.0
18.	Monopoly-resembling vendor conditions	14.9	15.5
19.	Vendors tend to oversell	15.5	16.9
	Kendall's *W*	0.354	0.563

The Kendall's tau values (Table 2) shows the similarity between the three panels. The correlation was statistically significant between procurement officers and CIOs, with a value of 0.450. However, as the value is below 0.5 there is not a high level of agreement and it made sense to have separate panels. The correlation was even smaller between the internal stakeholders (procurers and CIOs) and the vendor representatives. We will explore the differences between the panels further in our discussion section.

Finally, Kendall's *W* values in Tables 3, 4, and 5 indicate the level of consensus between different members of each panel after both rounds of ranking. The consensus increased in all three groups from the first to the second round. Yet another round might have led to a loss of respondents without the consensus increasing all that much.

5 Discussion

We discuss our findings in light of previous research and whether prior findings (Table 1) are confirmed. More importantly, we identify challenges that have not been highlighted before. Our results are all from Norway, but we would argue that they may be equally valid for other countries with the EU/EEA procurement regulations or similar regulations.

5.1 Relationship to previous results

Several of the main findings relate to stakeholder issues. The different stakeholders had differing views on the procurement challenges, the Kendall's tau values showed clear differences between the three panels. This difference between the stakeholders may in itself be a challenge. If we had included internal users as yet another stakeholder group in our panels, we might have found further differences.

We also found that vendors ranked the issue of cooperation between stakeholders among the top five challenges. This confirms previous findings on stakeholder issues being important in e-.(Flak et al., 2008; Flak & Rose, 2005; Rowley, 2011).

At least one of the other challenges may also be related to conflicting stakeholder demands: the issue of municipal cooperation, which involves stakeholders from more than one municipality. Municipal collaboration on procurement and on certain services is an important issue in parts of the Norwegian municipal sector, due to a high number of fairly small municipalities. Some networks of neighbor municipalities run joint procurement processes, where they negotiate better prizes, and move to a more shared portfolio of Information Systems.

This was not rated among the top five challenges by any of the groups, it could be due to our sample of respondents from public sector, some of them were from regional governments or hospitals, and for them this challenge is irrelevant.

The panels did not highlight any issues related to information asymmetry with consultants, even though we asked for challenges in procurement of information systems and IS services, including consulting. The issue "Vendors trying to oversell", may be related to information asymmetry. This was in the narrowed down list, but it was ranked consistently low. On the other hand, our findings did not suggest that gaps between stakeholder goals and project goals were a challenge (Pan 2005).

Our data suggested that balancing between different objectives (Thai 2001) and goal ambiguity (Boyne 2002) is a challenge. The terms were not used in our consolidated list, but vendor respondents point to feasible requirements, i.e., customers are asking for more than they plan to use, as one of their top challenges (2). According to one vendor, this challenge is due to "Many stakeholders being involved in the early parts of the procurement process; they all have their wish list, and no one takes charge of prioritizing and shortlisting". We did not find support for favoring of local vendors and minorities as a challenge. This was surprising, as the vendor representatives in our sample were mainly from the big national vendors, and should be inclined to bring up the issue if they felt it caused them to lose contracts. Partnership and innovation was also an issue, especially for the CIOs (6) and the vendors (6). Transparency for ensuring fair competition between vendors is clearly a public-sector-specific challenge; private firms can be more pragmatic on these issues.

We were surprised to find that our participants did not identify "uninterested vendors" on the list of nominated challenges, as previous research has suggested (Moe et al., 2006). However in the brainstorming one of the vendors listed expensive process due to complex regulations as a challenge and remarked that as a consequence large companies decide not to compete for procurement tenders in small municipalities in more remote areas. And none of the experts mentioned the possibility of smaller vendors not being able to take part due to the costs of the process, and the risk of not being selected. This may be due to our selection of vendor representatives; we invited only vendors who already sell a lot to the public sector.

Our results confirm "Specify requirements before announcing tenders" as an important challenge. Our panelists have used other denominators that are clearly linked. They see developing "Clear requirements" as one of the key challenges. The regulations normally require procurement entities to develop requirement specifications without talking to vendors. A procuring entity may have limited knowledge of what to ask for in a niche area. And they are dealing with experienced vendors who know their software. This challenge of developing "Clear requirements" is rated high both by procurement officers (2) and by CIOs (1). Our panelists also brought up the issue of "Complete requirements," which they ranked slightly lower (rank 6 and 14, respectively).

The regulations concerning public procurement may partly explain why these issues are so important. Tendering is the most common way for the public sector to procure information systems, and previous research has shown the dilemma concerning specifying requirements before talking to the vendors (Moe et al., 2006). The vendor panels had a slightly different view on the challenges, highlighting feasible and realistic requirements from their customers, but were less concerned with getting the specifications completely and clearly. It may not be in all vendors' interest to have clear and complete requirement specifications, as this may give them less leeway when creating their bid.

A main challenge for the vendors is rather to get an opportunity to show their qualities. The very detailed requirement specifications would limit these possibilities.

Vendors viewed "Focusing on initial procurement costs instead of life cycle costs" as the top challenge, hence the previous finding (Tysseland, 2008) is supported. In the brainstorming some of the panelists explained this challenge and the consequences of not solving it.

According to one, the inherent processes in the systems are not evaluated as part of the selection. Only costs for investment, user support and maintenance.

5.1 New findings

There are some interesting new findings in the lists of top challenges (tables 3-5). Experts across all three panels rated the issue of facilitating change in work processes and benefits realization as the most important procurement-related challenge (1, 7, and 4). This finding supports the benefits realization literature (e.g., (Ward & Daniel, 2006), which highlights the importance of planning from early on for benefits from IS investments. Procurement managers actually ranked change management of work processes and benefits realization as the top challenge. This may be somewhat surprising, as the change of work processes starts after a contract is signed and the responsibilities of the procurement personnel are finished. The issue has not been identified in previous literature. However, the challenge of establishing benefits realization practices from IT investments in the public sector has been identified in other studies (Päivärinta & Dertz, 2008; Päivärinta et al., 2007). The issue of benefit realization and lack of achieved benefits has also been highlighted in the eGovernment research(Gilbert et al., 2004; Moon, 2002).

Our results indicate a need for further research and for education on benefits realization practices in connection to IS procurement in the public sector.

The issue of technological integration and compatibility of purchased systems was ranked third both by the procurement managers and the CIOs. This is a technical challenge, relating to questions like interoperability. Lack of integration results in siloed systems. Interoperability has been high on the agenda in the eGovernment field, and it is believed to be the most critical issue facing businesses that need to access information from multiple information systems (Park & Ram, 2004). Municipalities tend to have a large amount of information systems covering the needs of very diverse sectors.

There is an increasing pressure on government agencies to act in a more collaborative and integrated manner (Ryan & Walsh, 2004), which necessitates data exchange from municipalities to central government.

Lack of coordination and standardization of the procurement process was ranked as the 4th most important challenge by both procurement personnel and CIOs. In order to understand this issue we have to take into account the sample in these two panels, which were largely made up of employees in municipalities.

A need for coordination and standardization of IS procurement processes may be specific to countries with many small municipalities, However, this issue was consistently ranked high also among the panel participants from public hospitals and central government.

Finding and using good assessment criteria and weighing/prioritizing the assessment criteria were also high on the agenda of the internal stakeholders. This may be related to the need to stick to the requirement specifications due to the formal tendering process, and to the possibility of vendor complaints. In addition, rules and regulations were seen as hindering longer-term vendor-customer partnerships, both by CIOs and vendors (6). Longer-term cooperation could give some benefits such as less scope for opportunism from the vendors (Parker & Hartley, 2003), and trust relationships and coordinated strategies between buyers and suppliers (Parker & Hartley, 1997).

5.2 Implications for research and practice

Considering the overall differences between the panel prioritizations, our study supports Pan's (2005) suggestions for improving stakeholder management in public IS procurements. The classic challenge of coordinating between various stakeholders in procurement in general (Spekman & Stern, 1979) and in the public sector IS investments (Pan, 2005) emerged as one of the major challenges. Our results support previous calls for more focus on managing these challenges in public procurement practices and processes.

The experts further highlight the importance of clear, complete, and feasible requirements specifications. Increased focus on requirements specifications may be especially important for the public sector, since regulations specify tendering as the default procurement instrument and requirements generally have to be specified before inviting vendors to bid (Moe et al., 2006). This regulation-initiated requirement may be even more challenging, as software engineering and information systems literature since the 1970s has recognized the difficulty in defining "complete" and "clear" ex-ante requirements, requirements tend to change during development (e.g. (Parnas, 1979). Our data confirms that this dilemma still has to be solved in the public sector. One possible solution could be more use of competitive dialogue, where vendors are invited to participate in a competition and in a dialogue with the procuring entity before the requirements are fully specified.

The challenge of technological integration and system compatibility highlights the importance of involving IT expertise in the procurement process. In small countries, some vendors may have reached a "monopoly-like" position in some niche areas specific to public sector. On the other hand, due the regulations and strong focus on defining ex-ante requirements, vendors may have few opportunities to show their unique qualities, if the customers do not request these qualities specifically. The challenge of inter-municipal cooperation may be a case characteristic to Norway; municipalities have been rather independent with regard to their IT/IS implementations, and quite a few participate in inter-municipal procurement networks.

6 Conclusion and further work

This Delphi study revealed typical challenges for IS procurement in the Norwegian public sector. Three expert panels defined 98 challenges and dilemmas, divided into 13 categories: requirements specification, change management, cooperation among stakeholders, competence, competition, contracting, inter-municipal cooperation, governmental management, procurement process, rules and regulations, technology and infrastructure, vendors, and IT governance. The results provide a rich overview and complement the previous, largely conceptual and case-based literature on public IS procurement challenges.

The study supports previously identified challenges related to stakeholders and to balancing between their objectives related to requirement specifications. All relevant stakeholder groups should be involved in procurement projects. More research is needed on issues such as stakeholder management and on balancing different goals without asking for more than is needed. The interplay between procurers and vendors in public procurement has not previously been much researched. This interplay may not function very well in public sector due to recurring competitions and complex regulations.

One especially important issue is the conflicting interest of procurers and vendors. Procurement personnel strive for complete and clear requirements specifications, at the same time vendors seem to prefer less detailed specifications this would give them more room for showing qualities that are not mentioned in the request.

In addition, the study revealed challenges that have not been discussed previously in connection to public IS procurement, such as aligning benefits realization to procurement. The study further supports previous findings on plain focus on costs. If procurement managers and CIOs want to achieve benefits from investments in new systems, they need to balance the focus on cost with the need for quality, and they need to give room for vendors to show their qualities.

The challenge of complex and constraining regulations was also prevalent. This may make the process more complex and costly than needed, and may also hinder SMEs from participating. Lack of coordination and standardization was also revealed. Public procurement of Information Systems is a complex task, and many years can go by between subsequent projects in one professional domain, before new systems are bought, hence help should be needed. The problem could be overcome by copying successful procurement processes from other government entities or collaborating municipalities. However there may be risks with in doing this.

Our further work will also focus on creation of cause-effect relationships between the most commonly observed issues through qualitative analyses of the brainstormed data and through additional fieldwork. Another natural avenue for further work resides in cross-country studies, which might reveal more information about generalizability of these results to other countries with equally strict procurement regulations.

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Appendix A: Complete list of challenges

Category		**Challenge**	**Explanation**
1. Requirement specification			
Quality	1.1	Clear	Difficult to define clear and objective requirements.
	1.2	Complete	Incomplete req. specifications
	1.3	Feasible	Customers ask for more than they plan to apply
Content	1.4	User support as part of the requirement specification	Get optimal user support from the vendor
	1.5	Operations as part of the requirement specification	
	1.6	Requirement for specific technologies	Require for instance ASP or cloud computing
Process for developing the req. specification	1.7	Based on process improvements	Make a requirement specification based on, e.g., a process map or use-cases
	1.8	Verified requirements specification	
	1.9	Balanced/prioritized between different needs	
	1.10	Allocation criteria	Difficult to develop criteria for allocating contracts
2. Change management	2.1	Change of work processes and benefit realization	Difficult to achieve change of work processes and of the organization and to realize the possible benefits
	2.2	Resistance to change	

	2.3	User training for new systems and work processes	The need for training is not estimated properly
3. Different stakeholders, cooperation	3.1	Involvement of procurement personnel	Procurement of information systems may be done without involving the group with procurement competence
	3.2	Gathering of key personnel for the procurement process	Gather personnel with the critical knowledge
	3.3	Cooperation between different stakeholders	Different government sectors or business units have to cooperate, without understanding each other´s needs
	3.4	Differing viewpoints and interest in assessment criteria (of the vendor)	Need to find common criteria
	3.5	Conflict	Conflict between different business units
	3.6	Citizen focus	Not enough concern for “customers”
4. Competence	4.1	Procurement competence	
	4.2	Competence in rules and regulations	
	4.3	Judicial competence	
	4.4	Financial competence	
	4.5	Competence in negotiations	
	4.6	Product competence	
	4.7	Competence in license issues	
	4.8	Domain competence	
	4.9	Competence in existing systems and infrastructure	
	4.10	Competence in installation, testing and supplier responsibilities	
	4.11	The supplier’s competence	
5. Competition	5.1	Lack of methods for evaluation	
	5.2	Find good criteria for evaluation	
	5.3	Weighing/prioritizing between different assessment criteria	
	5.4	Comparing systems	
	5.5	Conditions resembling monopoly situations	Only a few vendors of the requested system type
	5.6	The supplier is not given the opportunity to show their qualities	The customer asks so that the vendor does not get the opportunity to show their competitive assets
6. Contract issues	6.1	Complexity, few complete contracts	Difficult to calculate the cost of all items specified in the contract
	6.2	Lack of use of the government’s standard contracts	
	6.3	The government’s standard contracts	These differ from traditional contract regulations (rules, laws)
	6.4	Unclear contract, differing understanding of contracts	Unclear if certain issues are included in a contract
	6.5	Contracts with duration over several years	Discounts included in longer contracts
	6.6	Frame agreements	Frame agreements that ensure flexibility or that have price mechanisms which are beneficial over

			time
	6.7	Contractual access to upgrades	
	6.8	Conditions	Vendor makes reservations concerning the conditions
	6.9	Unsatisfactory delivery	Unsatisfactory delivery compared to what has been specified in the contract
7. Cooperation be-tween municipalities	7.1	Municipal cooperation is challenging	
	7.2	Time-consuming, many stakeholders	
	7.3	Shared operations and "sector-specific systems"	This is often a condition for cooperation, but may require that all announce tenders at the same time
	7.4	Standardization of shared requirements	
	7.5	Need for shared requirement specification	
	7.6	Municipal cooperation affects assessment criteria	
8. Governmental management	8.1	Governmental order/instruction	New instructions without allocated funding
	8.2	Too weak governmental coordination and support	430 municipalities differ in their processes and requirements
9. Process	9.1	Lack of coordination standardization	Lack of coordination and standardization of work processes and systems (many municipalities have the same needs)
	9.2	ICT procurements vs. other procurements	Procurements are delegated to the specific unit, or separated from other procurements
	9.3	Choice of procedure	The regulations specify tenders as the main instrument, but negotiations may be a more suitable procedure
	9.4	Bureaucratic process	Cumbersome for the vendors
	9.5	Time-consuming and complex task	
	9.6	Expensive process	The cost of the process may be very high compared to the cost of the system,
	9.7	Progress plan	Responsibility and the customer's understanding of the progress plan
	9.8	"Keep within the progress plan" and "Too short deadlines for tenders"	
	9.9	Solving needs and problems that arise during the process	
	9.10	Payment schedule	
	9.11	Personnel	Keeping key personnel from quitting
	9.12	Acceptance test	Run within scheduled deadline
	9.13	Follow-up of contract	Both by vendor and customer
	9.14	Management of problems after delivery	Management of problems in the period after the first delivery—the period with contract for maintenance which follows implementation
	9.15	Holistic management	Holistic and overall management from decision of implementation to realized result/change
10. Rules and regulations	10.1	Complex regulations	There may be too much focus on regulations and too little on actual end result
	10.2	The regulations are not followed	
	10.3	Partnership and innovation is prohibited	Possibilities discovered during projects may not be utilized without a new tender. It is also difficult to

			utilize long term relationships
	10.4	Difficult to squeeze out lousy vendors	
	10.5	Tenders may conflict with long-term planning	Change of vendor generates “switching costs”
	10.6	Underutilization of vendor specific assets related to license agreements	
11. Technology and infrastructure	11.1	Consequences of large upgrades	
	11.2	Integration, compatibility	Interfaces to systems already implemented
	11.3	Reuse of components	
	11.4	Strategic choices of technology	
	11.5	Proprietary technologies, lock-in to vendors	
	11.6	Open standardized software and infrastructure	Software and infrastructure based on open standards
	11.7	Rigid systems	
12. Vendor challenges	12.1	Volatile markets (vendors merge or get taken over by others), products are phased out	
	12.2	Vendors oversell	
	12.3	Unsatisfactory/wrong delivery	Extra costs related to this
	12.4	Quality of consultant services	
	12.5	Service attitude with vendors	Lack of service attitude
	12.6	Overcome previous bad experiences, “punish the vendor”	
	12.7	Customers require access to reference customers so they can learn about their experiences	This is time-consuming, and some customers are frequently contacted
13. Governance	13.1	Security	
	13.2	Too much focus on strategy	Consultant fees get high, and fewer resources are left for procurement
	13.3	Lack of strategy	
	13.4	Lack of IT architecture	
	13.5	Requirement of local control	Requirements concerning placement of hardware and use of in-house developed software
	13.6	Lack of control	The customer is not in control of his/her equipment
	13.7	Anchoring	
	13.8	The responsibility dissipates	
	13.9	Too much focus on costs	Too little focus on possible benefits and on quality
	13.10	Lack of willingness to test new solutions	

The Public Procurement of Software: Dialectics in Requirements Specification

Abstract

In acquiring information systems, public procurement entities face a dilemma. On one hand, they want to procure a system that best suits their needs and this requires dialogue with vendors, often prolonged. At the same time, they are restricted by government regulations that mandate reduced dialogue in the interest of transparency and equal opportunity for all vendors. We followed three procurement projects in two municipalities in Norway to examine how public entities deal with this problem. Our analysis reveals that this dilemma manifests as a dialectic between the thesis of getting the system requirements right and the antithesis of strictly adhering to regulations. Procuring entities seek a synthesis through two strategies: selecting an appropriate tendering procedure and learning through networks of peer entities. Based on our findings, we propose a prescriptive framework to guide procurement units to select the most appropriate tendering procedure.

Keywords: Procurement, public procurement, government procurement, information system procurement, information system acquisition, requirements specification

Introduction

Public procurement of Information Systems (IS) can be a highly complex process. One of the biggest challenges that procurement units face concerns requirements specification. The units have to adhere to strict regulations enacted by policy-making bodies such as the European Union (EU). These regulations require a transparent process with equal opportunities for all vendors. As a consequence, it burdens the procurement units with the onerous task of setting strict and precise requirements specifications. Due to the rigidity within the regulations of changing what are often incomplete requirements (Ovaska *et al*, 2005), public procuring entities find it challenging to specify complete and clear requirements specifications (Moe & Päivärinta, 2013).

Public procurement includes formulating business requirements, developing requirements specifications, and purchasing (which may include tendering and contract signing), receiving and inspecting the product (Moe, 2014). A public procuring entity is a public organization (municipality, public hospital, government agency or unit within) that procures a service or a product. These units often lack internal competence in evaluating different systems alternatives, which further complicates the process of identifying requirements. There is often a knowledge asymmetry between a procuring entity and the vendors.

Our study aims at understanding how a public entity navigates through this complex web of regulations and procedures in its quest to procure the system that best meets its requirements. We seek to answer the following research question:

> "*How can a public procuring entity follow the regulations and simultaneously procure the Information System best suited to its requirements?*"

We studied three cases that differed in the type of system procured, the organization of the projects, and the procurement procedure applied. The rest of the paper is organised as follows: The next section explains public procurement and the main procedures in the EU/EEA area. Following this we describe the research method we employed and present the findings. We discuss our findings in the subsequent section, where we first briefly describe our analytical lens. We conclude the paper by presenting the implications of our study for practice and suggesting directions for further research.

Procurement procedures

Procurement has become the normal way of acquiring information systems, as few private companies and public entities are capable of developing their own systems. Common approaches include buying commercial off-the-shelf systems and, in the case of larger companies, sourcing software houses or developers to develop tailored systems.

Procurement can be categorized into two broad forms: "partnership sourcing" and "adversarial competition" (Parker & Hartley, 1997). Partnership sourcing implies outsourcing work (e.g. systems development on a more or less regular basis to the same vendor). Adversarial competition implies rivalry between two or more vendors for a

contract. This is done through a tendering process defined as making an offer, bid or proposal, or expressing interest in response to an invitation or request for tender. The focus of our paper is on adversarial competition, since public procurement generally requires open competition.

Private companies are free to acquire Information Systems in the way they find most beneficial. They can select a vendor without any competition, run dialogue with one or more vendors as needed and change their requirements during the process in consultation with the vendor.

By contrast, public procurement differs from private procurement due to strict regulations in large parts of the world. In the European Union (EU) and the European Economic Area (EEA), two public procurement directives (EU, 2004a, 2004b) are in effect. Underlying these are the principles of transparency and non-discriminatory competition (Cox, 1994). In the member countries, all public procurements above the threshold level of €207,000 have to be announced through EU`s Tender Electronic Database (TED). This makes the call visible world-wide, and vendors are given the same opportunities, irrespective of location. Some countries have additional national threshold levels beyond which a call has to be announced in the national database. For example, the threshold in Norway is NOK 500,000 (approximately €58,000). In the United States, public entities have to comply with the Federal Acquisition Regulation (FAR). Other countries have similar regulations. The legal regulations lead to a more complex procurement process in the public sector. The main procedures used under the EU regulations are elaborated next.

Procurement procedures under the EU regulations

EU regulations allow four main tendering procedures: open tendering, restricted tendering, tendering with negotiations and competitive dialogue. Specified in two public procurement directives (EU, 2004a; 2004b), the tendering procedures are all based on the principles of openness and transparency, and equal opportunities for all vendors.

The simplest procedure is **open tendering** (Figure 1), where all vendors can compete based on a tender announcement and a frozen requirements specification. Vendors can

be excluded on grounds of certification, economic standing and technical abilities, if it is stated explicitly in the tender announcement. After the selection, the process is basically the same. Hence, the last phases (contracting, implementation and completion) are not shown in the following Figures 2–4.

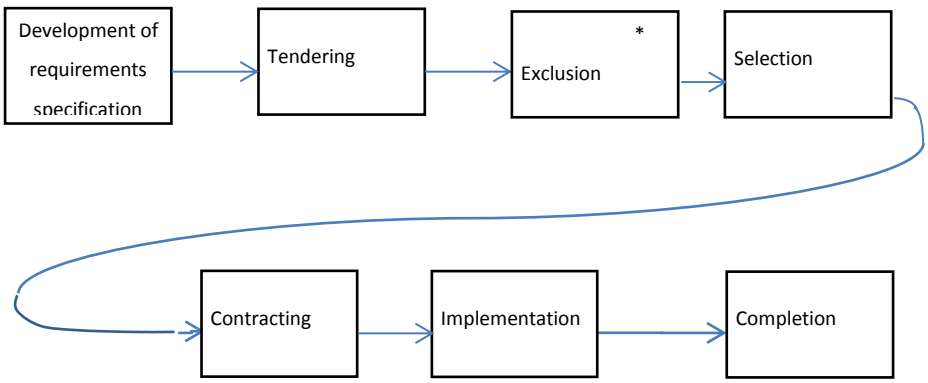

Figure 1: Overview of phases in open tendering. The exclusion phase is optional (*)

In **restricted tendering** (Figure 2), vendors are invited to submit documentation for prequalification. The procuring entity can specify a maximum number of vendors that will be allowed to compete, as well as the selection criteria it will apply. The minimum number is five. Development of requirements specification may be carried out in parallel with pre-qualification of vendors.

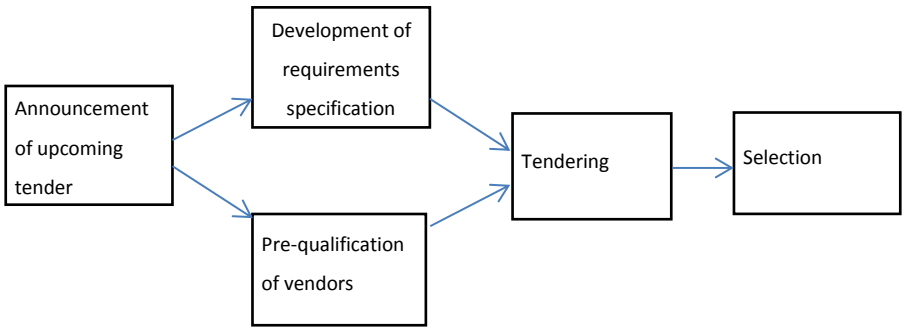

Figure 2: Overview of phases in restricted tendering

Negotiated procedure (Figure 3) also includes prequalification. The procuring entity can run negotiations on all aspects of an offer, including technical features, price and contract issues. This procedure is only allowed when the technical specifications cannot be established with sufficient precision. If there are three or more qualified candidate

vendors, at least three must be invited to participate. Negotiations may be carried out in stages, and the number of vendors participating may be reduced through this process.

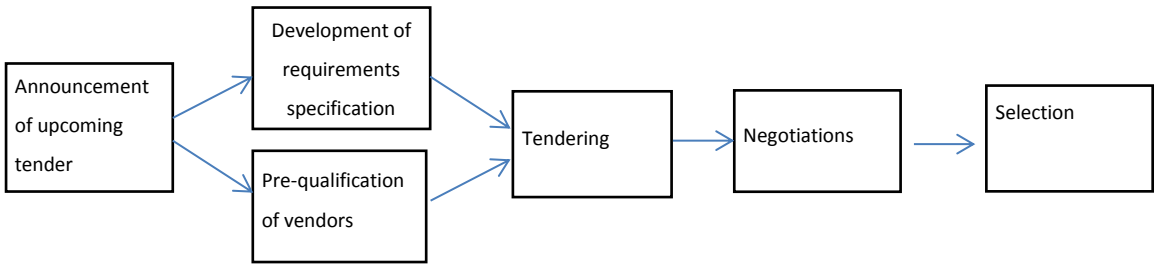

Figure 3: Overview of phases in tendering with negotiations.

In **competitive dialogue** (Figure 4), the procurement entity can carry out a dialogue with the vendors that pre-qualify, before finalizing the award criteria and getting the offers from these vendors. This is only permitted for particularly complex contracts in markets with technical, legal or financial complexity. Legal or financial complexity arises very often in connection with public-private partnerships. Technical complexity involves situations where a contracting authority may not be able to determine which of several possible solutions would be best suited to satisfy its needs (EU, 2005). At least three vendors must be invited. The procedure does not allow negotiations after offers have been submitted; however the vendor that has submitted the most advantageous tender may be asked to clarify aspects of this. The dialogue may run over several individual meetings with the vendors, and serves as input to the requirements specification. The number of vendors may be reduced through successive stages.

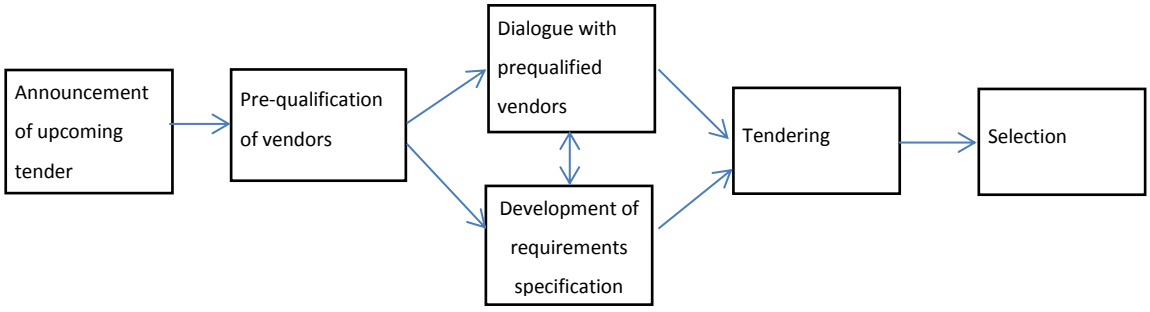

Figure 4: Overview of phases in competitive dialogue

Table 1 compares the four public procurement procedures on interactions with vendors.

Table 1: Comparison of the four public procurement procedures

Issue / **Procedure**	Exclusion possible	Pre-qualification	Dialogue during requirements spec.	Negotiations after finalizing req. spec.
Open tendering	√	-	-	-
Restricted tendering	-	√	-	-
Tendering with negotiations	-	√	-	√
Competitive dialogue	-	√	√	-

Open tendering is the most common procedure: about 73% of all tender notices applied this. Restricted tendering was applied in approximately 9% of the tender notices and negotiated in nearly 16% of the tender notices. Competitive dialogue accounted for only 0.4% of the number of tender notices, but as much as 8.6% of the monetary value in 2010 (Strand *et al*, 2011). The first three procedures (open tendering, restricted tendering and tendering with negotiations) have been in operations since 1988 while competitive dialogue was established in 2004 as an alternative to tendering with negotiations, with the aim of making public-private partnership easier (Barlow *et al*, 2010).

In all the procedures, a minimum number of days for each step must be allowed to give vendors sufficient time to prepare their offers. All vendors must be allowed access to the same information. Procuring entities have to keep written documentation of the process, so competing vendors can get access to the appropriate records after the procuring entity has chosen the vendor. A vendor who is initially selected to continue in the process but is later eliminated is entitled to a detailed explanation of the reason for elimination.

In summary, we can see that the complex procurement process and the regulations governing procurement can raise conflict between the goals of abiding by the regulations and obtaining the system which best meets the requirements. Our study is aimed at understanding how public procurement entities manage this dilemma.

Method

We employed a multiple case study approach and collected data from three different public procurement projects in Norway. We followed the projects from just after the announcement of tender (open tendering) and of upcoming tendering (the other two procedures) up to implementation and completion. We selected the cases after seeing them on DOFFIN (the national portal for public tenders). In all three cases, we were able to attend internal meetings and meetings with the vendors. We attended 25 such meetings. Notes were taken and the meetings were digitally recorded. However, a full transcription of the meetings was not possible due to microphone problems.

We interviewed project leaders, members of the project groups and the winning vendors. In two of the cases, we also interviewed the losing vendors. In all three cases, we conducted an extra interview of the project manager a year after implementation, in order to get the full story beyond the implementation. In total, we conducted 31 interviews. Eleven interviews were conducted over Skype. The other interviews took place at the subjects' premises. See tables A1-A3 in Appendix A for an overview of the interviews. In addition, we had access to internal documents in all three cases and to e-mails to vendors in one of the cases for details, see Appendix B

We tried to apply some of the best practices in conducting employing qualitative interviews (Myers & Newman, 2007). For example, we were able to enter the three public organizations at a high level of entry, through personal contacts. Consequently, we were able to get access to staff and vendors at various levels at these organizations.

All interviews were largely unscripted, with just a few key questions to guide the subject in the opening stage. The use of mirroring in questioning allowed us to focus on the subjects' world and language rather than imposing our world. All interviewees were allowed to read the transcripts and correct or delete parts they felt were incorrect or that they did not want to disclose. All interviewees were asked if we could follow up if we needed to clarify some of the data. We followed the traditions of interpretive research (Grover and Kettinger 2000, Walsham 2006).

Our analysis is based on the textual material detailed above. By carefully reading the interview transcripts and other material obtained, we were able to interpret the

responses and construct faithful descriptions of the process of procurement of IS in the cases. We did not try to force the evidence into a single story line but instead maintained several stories, including dissenting voices. We carefully selected several verbatim quotations (translated from Norwegian) in the findings to give the reader an insight into the processes.

According to Gibbons (1987), our interpretations should attempt to **recover** the original meaning of stories, as seen from the subjects' various perspectives. In our case, this was done in the process of providing feedback to the interviewees and allowing them to comment on the transcript. The final transcripts then represented their stories. Following Gibbons we tried to uncover important meanings operating behind the stories—issues that the subjects may not even are aware of.

Findings – the case narratives

The first case involved procurement of a claims system for one of the 10 largest municipalities in Norway. The second case involved procurement of an Electronic Health Record (EHR) system for a medium sized municipality (among the 20 largest). The third case involved procurement of a system for backup and archiving in the same municipality as case 1. Table 2 gives an overview of the cases. We present them in detail in the following subsections.

Table 2: A brief overview of the cases

Type of system	**Type of procedure**	**Project period**	**Resource use ***		**Cost of system**
			procuring entity	per vendor	
Case 1: Claims system	Open tendering	Feb. 2012 - May 2013**	300 man-hours	50-100 man-hours	1.0 m NOK (€117,000)
Case 2: Electronic Health Record system	Tendering with negotiations	Jan. 2012 – Feb. 2013**	4 500 man-hours	175-250 man-hours	2.4 m NOK (€280,000)
Case 3: System for backup and archiving	Competitive dialogue	Feb. 2012 – Jan. 2013	540 man-hours	150-200 man-hours	1.9 m NOK (€221,500)

* The estimated use of resources is the figure prior to implementation

** The project groups were formally dissolved, but some informal project organization remained. In case 1, the implementation was not finished until well into 2014 due to integration problems

Case 1: Procurement of a claims system: open tendering

The system in this case would collect claims from citizens who had not paid invoices for items such as public housing, children care and real estate tax. The municipality's legacy system had existed for more than 10 years and was owned by the claims department. Until 2006, it had a budget and accounting system from the same vendor who had supplied the old claims system. At this point, the municipality procured an ERP system from a different vendor as a replacement for the budget and accounting systems. The ERP system was owned by the accounting department and not by the claims department; however, the two departments were located in the same building and they had frequent informal contact.

A new claims manager was appointed in 2010, and soon after taking up the position, she considered running a tendering process as she saw the need for a more "modern" system. In 2012, the vendor of the old claims system decided to bundle claims with their ERP-system. Subsequently, the vendor terminated the contracts with all users of the claims system that did not use their ERP-system; hence, the municipality was obliged to procure a new claims system. The timeline of the process is shown in Figure 5.

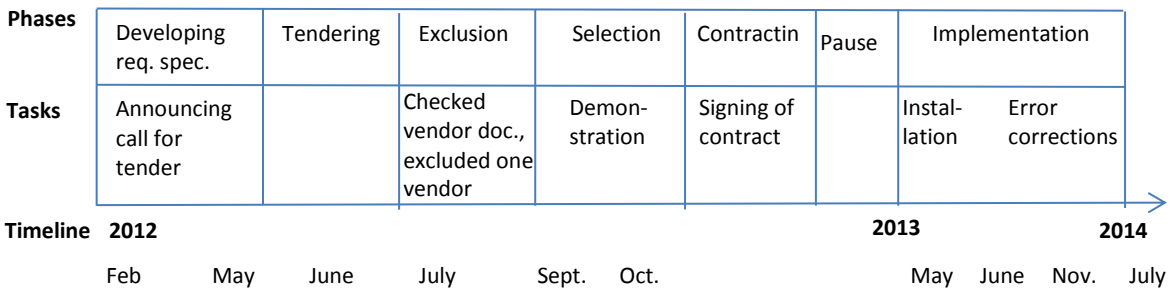

Figure 5: Timeline of the procurement process for the claims system, showing the different phases

Organising

The procurement project was initiated by the claims manager in February 2012. She formed a group consisting of herself as project leader, a super user from the claims department, a super user for the ERP-system from the accounting department and the IT technician who was responsible for operations of the ERP-system. The group also

included a procurement manager whose role was as a consultant to the group. While new in the role of procurement manager, he had extensive experience from senior positions in the municipality. Prior to starting the project, two vendors had been active in promoting their systems, and the group also knew about a third vendor in the market.

Requirements specification

The project group used the period from February to May to develop the requirements specification. It borrowed requirements specifications from two municipalities, one of a similar size and the other somewhat larger. We were told: "*It was a huge advantage for us to have a starting point, for there are an enormous number of details*" (claims manager, 14.05.13). However, the two municipalities that provided their requirements specifications differed both in terms of how they had organised the claims' process and in their internal organisation. The project group tried to tailor the specification to suit their needs by working their way thoroughly through these specifications, and deciding whether an item was relevant for them or not. The danger was: "*what they have not included will also be forgotten by us*" (claims manager 14.05.13). They distinguished between features that were nice to have and features they really needed. The super user for the claims system told us (13.05.13) that her "discipline was never really discussed". However, she felt it was useful to have the ERP super user and the technician involved in the procurement process.

Tendering

The call for tender was announced over DOFFIN in May, 2012, with a deadline for offers in June. The project group decided to run the procedure of open tendering and announced exclusion criteria, enabling the exclusion of vendors that did not comply with specific social criteria and labour policies or vendors that were considered to be vulnerable. The criterion of vulnerability was included after the procurement manager had been told about the importance of this from another procurement manager at a training course (procurement manager 01.07.14). Accordingly, vendors had to file documentation on revenue and tax issues, internal organisation and overview of staff, with CVs of key people for this system. The municipality subsequently received two offers.

Exclusion

After screening the vendor documentation, the project group found in early July that one of the vendors was not qualified due to vulnerability. This vendor had only two employees: the systems developer and his wife. The project group was afraid that if the systems developer had an accident or fell ill, the vendor would not be able to maintain and update the system in line with new governmental requirements.

The project group notified this vendor of their disqualification in mid-September. Subsequently, the vendor filed a complaint to The Norwegian Complaints Board for Public Procurement. Nevertheless, the municipality continued the process as they felt certain that they did not risk any sanctions. It took two years for the complaints board to decide finally that the municipality had acted according to the regulations.

Selection

Without disclosing that there were no competitors, the project group invited the remaining vendor to give a demonstration of the software in early September. The super user of the claims system told us that the demonstration was "*very superficial*". She commented: "*You get some answers, but you end up having more questions. But when 70 municipalities already use this system, how much time should you spend on checking if it can be applied by us?*" (super user, claims system 13.05.13). The project group contacted several of the municipalities that already used the system to get their experiences. The decision to procure the system with add-on modules was made in early October.

Contracting

The procurement manager and the claims manager met the week after selecting the system to prepare for the contract meeting. The contract, which was based on the government´s standard contract for IT-procurements, was signed in the second half of October. There were no disagreements on the contract. Rather, the meeting involved clarifying whether to convert data from the old system and what add-ons to include. Installation was set for 1st May 2013.

Implementation

One important feature of the claims system was its integration with the ERP-system in use. The project group wanted to transfer data between the two systems so that new claims would update the accounting module of the ERP-system. However, a few days prior to the installation, the project group discovered that the claims system was developed to run with the newest version of the ERP software and hence was incompatible with the version run by Accounting. The new version of the ERP software was needed. Implementation was postponed and the new claims system was not installed until a month later. At this juncture, flaws in the integration were discovered that required manual checks of the output from the claims system. The biggest concern was sending incorrect claims to citizens. In July 2014, more than a year later, the claims department was still experiencing problems but felt that all the remaining flaws were known and under control.

Afterthought

The choice of procedure (open tendering) was made by the procurement consultant. It is the most common choice in public procurement, but perhaps not the most appropriate for the procurement of IS. Nevertheless, we were told that "*they had done a good job on their requirements specifications*" (winning vendor, 08.03.13). The claims department experienced significant problems in integration, echoing the finding of a Delphi study (Moe & Päivärinta, 2013) that ranked integration as one of the most serious challenges in public procurement of IS. In the selection phase, the project group carefully checked with other public entities that had acquired the same system. However, none of these entities had the version that was made to integrate with the version of the ERP system in the case.

Case 2: Procurement of the Electronic Health Record system: tendering with negotiations

The procuring entity in this case was a slightly smaller municipality who had been using an EHR system from a local vendor for 15 years when the procurement project started. The old system had been developed by a one-man company, and the municipality was "*one of*

a total of 7-8 municipalities" using this system and by far the vendor's largest customer, and "*we have got very much of what we asked for*" (super user, legacy system, 30.01.13).

The procurement was initiated to meet new government regulations promulgated in 2010, mandating message exchanges between municipalities, local GPs and public hospitals. The municipalities were given 3 years to comply. Accordingly, the case municipality established a message exchange project in 2011. The vendor of the existing system was unable to upgrade it to meet these new requirements, and in February 2012, the municipality established a subproject to procure a new EHR-system. The timeline of the procurement process is shown in Figure 6.

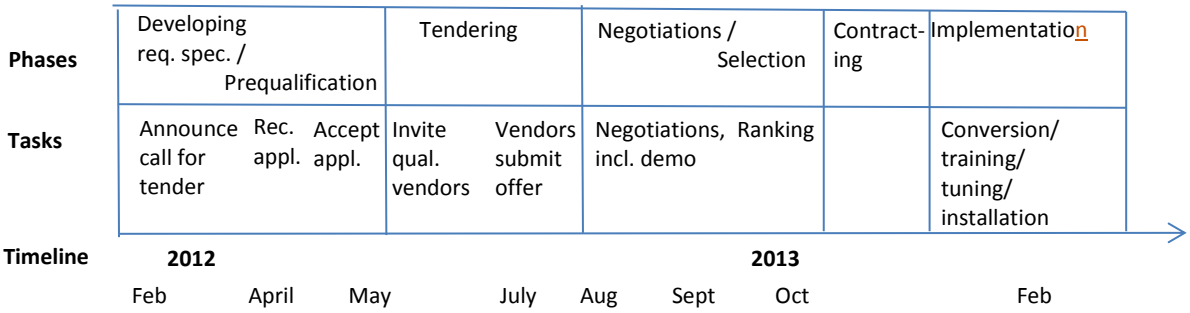

Figure 6: Timeline of the procurement process for the Electronic Health Record system, showing the different phases

Organisation:

The project group consisted of four internal staff members: the leader of the message exchange project, the leader of the procurement project, a super user of the old EHR system and the person who was designated as a super user of the new EHR system in the municipality.

This municipality was part of a network of seven adjoining municipalities, who cooperated on procurement (among other issues). This network had established a shared procurement entity, which could be engaged on a for-fee basis. As required, the procuring municipality invited the network members to take part in the project. One smaller municipality joined. The project group was expanded to include two members from this municipality. The project group consulted with the shared procurement entity who assigned one of their employees as a consultant for the project. This employee had experience from several IS procurements, including the procurement of an EHR system by another municipality in the network.

The project group experienced some internal conflicts. The super user of the old system did not want a new system. According to the procurement project manager, this resulted in some rather heated discussions. This user was a proponent of converting data from the old system, which managers of both the procurement project and the message exchange project opposed. There was also concern about the role of the members from the smaller municipality. The project leader was uncertain whether they had any authority over the selection of a solution. She asked the procurement consultant, but did not receive a clear answer. The project group also established a reference group of 16 members, all from the bigger municipality, planning to assign them the role as super users in the different units.

Requirements specification

The process started with development of requirements specifications in February 2012. The project group based their work on a requirements specification for an EHR-system developed two years earlier in a neighbouring municipality. The group also ran a full day brainstorming session with the reference group to get input on their needs. However, much of the input from this session was not included in the process. Members of both the project group and the reference group also visited three municipalities of approximately the same size that were using systems supplied by the three main vendors of EHR-systems in Norway. The project group then developed the requirements specification based on these inputs, finishing the task in mid-May.

Prequalification

In April, the municipality announced a call for tender with negotiations, and interested vendors were asked to submit credentials for pre-qualification by early May. The procedure was chosen because "*systems such as this are usually so complex, that it is hard to describe everything in a requirements specification. There will always be questions, and clarifications may be needed, clarifications that may tend towards negotiations*" (procurement manager, 26.02.13). Three vendors submitted the required documentation. All qualified, although one was requested to send updated documentation on their latest tax report.

Tendering

All three pre-qualified vendors were sent the requirements specification in mid-May and invited to submit their offers by early July. They all did. Vendors that take part in public tendering seem to be efficient in this process, "*we have people who are responsible for collecting required documentation and have it available as we often take part in public tendering. The process of preparing our tender took approximately 40-50 hours"* (winning vendor, 11.02.13).

Negotiations

Each of the three bidding vendors was invited to a series of three individual day-long, face-to-face negotiation meetings. The meetings took place between August 28th and September 14th, 2012, with exactly one week in between each meeting for each vendor. In the first meeting of the series, the project group ran through the requirements and asked each vendor to explain how they had addressed each issue. They were further asked to explain how the system features of their solution met the requirements. Through this, the municipality found that the vendors in some cases had wrongly claimed compliance with the requirements.

The second meeting concerned price and contract terms. The municipality had, as part of the requirements, asked for a contract in line with the government´s standard contract. Nevertheless, two of the vendors had their own standard contracts, and the project group considered one of these contracts to breach important criteria. This caused an extra meeting of the project group (also attended by two procurement managers) prior to the second negotiation meeting with this vendor on how to handle this breach. The project group decided that the suggested contract could not be accepted, and the vendor was given a deadline of five days to provide a new contract. The vendor sent a new contract within the deadline, but the project group was still not satisfied. There were heated discussions on whether to disqualify this vendor. The procurement manager warned about the possibility of this vendor filing a complaint, as the vendor was known to have good lawyers. In the end, the project group decided not to disqualify the vendor.

Selection

At the third meeting, each vendor was asked to demonstrate their system, with two assigned cases to most of the project group and the whole reference group of 16 representatives of the different units. The reference group was allowed to ask questions during the demonstration. One of the project group members chaired the meeting, and she was very careful not to allow too many questions or any deviations from the agenda. The members of the reference group had all been given a form beforehand and were asked to rate the system on a number of criteria. The rating forms were collected at the end of the meeting and the project group used this as input for evaluation. Although some of the forms were not filled properly, all forms were taken into account. The members of the project group also did their ranking, and based on this, one vendor was eliminated, leaving two in contention by mid-September. The project group carried out a short round of telephone negotiations with both these vendors, before selecting one winner. Looking back, this was the one they had expected would win from the start, but "*the (systems) were much closer than expected …all three meet the requirements ... it is hard to decide what (features) are decisive*" (procurement project manager, 26.02.13).

Contract signing

The municipality signed the contract with the winning vendor in October, but found that a few contractual issues needed to be clarified (procurement project manager 15.11.12).

Implementation

The vendor started preparing the installation in November, and the system went live in mid-February 2013. The process started with serious concerns about the communication with the project leader from the vendor´s side. However, this was resolved. The process included training the users, conversion of a limited amount of data from the old system, building entities to represent the units and subunits in the organisation, creating profiles for users, and planning the actual implementation. As part of this, pilot tests were run. There was a major problem on the morning of the first day of running the new system; no user was able to log in because a backup the night before had overwritten the data.. However, this was fixed before most users had arrived at work. The need for a software add-on was then discovered, which resulted in a new tender (super user – new system,

23.09.14). Only the winner of the first tender was in a position to submit an offer and it duly won.

Afterthought

The project group chose tendering with negotiations after advice from the procurement consultant. He had previous experience with the procurement of IS and was clear on the need for dialogue and finding out more during the process before making a selection. After implementation, the procurement entity found there were reports missing and a lack of service from the vendor. However, implementation was smooth, possibly due to the procuring entity requiring a detailed implementation plan during negotiations.

Case 3 - Procurement of the backend system: competitive dialogue

The procuring entity was the IT-department in the same municipality as in case 1. The procurement concerned a backend system for backup and archiving. Hence, the users were IT-staff, and there were only IT-employees in the project group. Instead of consulting with the procurement department, the group used an employee from the IT-department who was being trained to run procurements.

The need for a new backup-system arose from a rapidly growing amount of data. The team members feared that due to this, IT services would not be able to run a full back-up with the old system during weekends. There was also an anticipated need for an archiving system. As the project group was not certain of the needs before starting the process, it chose to use competitive dialogue as the procedure. The timeline of the procurement process is shown in Figure 7.

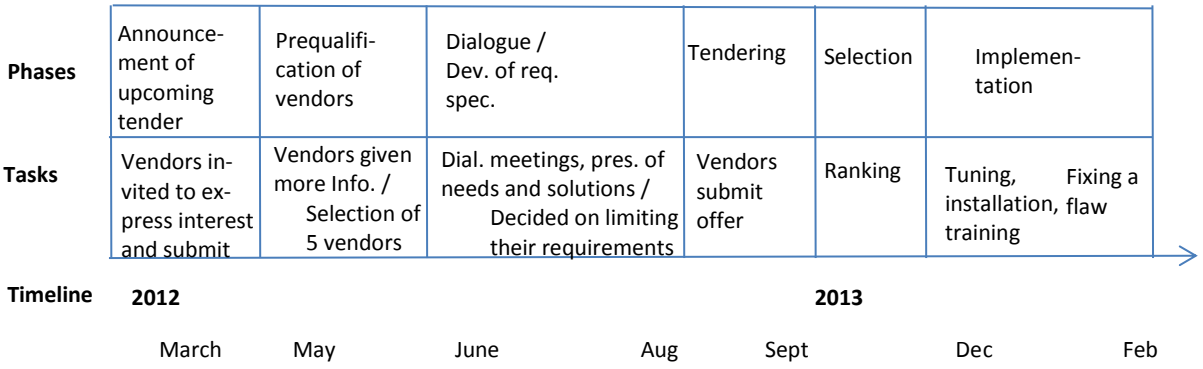

Figure 7: Timeline of the procurement process for the backup and archiving system, showing the different phases

Announcement of upcoming tender

A notice of the upcoming procurement was announced over the national portal for public tendering, DOFFIN, in March 2012. The municipality was careful not to announce information which could compromise security. Vendors were invited to express their interest in participating and to submit their credentials.

Pre-qualification of vendors

Sixteen vendors expressed interest in participating and asked for more information which was provided. By mid-May, a total of seven vendors had asked to be qualified for the next phase by submitting credential documentation, together with a suggested solution. Some vendors suggested two alternative solutions. Based on prior experience with similar projects, five vendors with a total of seven solutions were selected for the second round, which included dialogue.

Dialogue and development of the requirements specification

Each vendor was invited to three dialogue meetings. The first round of meetings with the vendors took place over two days, and two weeks later, the second round took place over three days. At the first meeting, vendors were given a presentation of the needs that the project group thought the municipality might have and of the current infrastructure in terms of number of users, amount and type of data stored and the number of locations. All vendors offered solutions based on software from two or more international software suppliers. These first meetings followed the same format: two persons from the municipality`s project group ran the presentation, and talked about possible needs both

for archiving and backup, and the vendors asked questions. At the end of these meetings, the vendors were told about the process and asked to set aside time for two more meetings, which they could run over telephone to avoid travelling.

In the second round of meetings, vendors were asked to present ideas on what the municipality needed and their solution. Although given the opportunity to run the meeting over telephone, all vendors travelled to the municipality, "*because they were afraid of losing opportunities for more information or better presentation of their solutio*n" (project manager 13.11.14). The vendors differed in the way they ran this meeting. Some came with "*some presentations, they were somewhat prepared, whereas others were more hesitant, and wondered if we should ask and they answer, whereas we had expected them to present*" (project group member 29.10.12). The third meeting was planned to give the vendors the opportunity to give more details about their solutions. However, the project group decided not to run the third meeting, as "*I felt the need to have as few meetings as possible in order not to incur more costs on them. In the end, only one vendor gets the contract*" (project manager, 26.10.12).

Tendering

Based on these dialogue meetings, a final tender announcement, including a finalised requirements specification, was sent in June 2012 to four vendors selected from the five in the earlier phase. They were given a deadline in August for their offers. The project group received in total five offers from the four vendors, as one of the vendors had two different solutions.

Selection

Based on a quantitative ranking of the formal written offers, the project group selected one of the solutions from one of the vendors in September. The contract was duly signed and the system was implemented by mid-December.

Implementation

The implementation included a training course for two employees from the municipality and a week's work for one of the vendor's technical experts. He came and sat on his own

in one of the data rooms and set up the installation (he was described as "*a sort of superhuman*") (super user backup, 29.10.12).

In January 2013, the project group met with the vendor to clarify whether everything had been done and delivered according to the contract. As one add-on module was found missing, the system was not fully accepted and the municipality held back part of the payment for a period. However, within three weeks this was resolved. In spite of accepting the system, there was still one flaw relating to archiving of e-mails from the Exchange-server. The vendor sent a system expert from their international supplier a number of times, but he never managed to fix this. The project group also had regular meetings with the vendor for a period through a contact person, but stopped when he moved on to another company.

Afterthought

According to the project leader, it was probably her idea to apply competitive dialogue. This procedure was also chosen because they wanted to try it out to see if it could be useful in other procurements. This was in spite of what was considered the norm in the municipality and they got the backing of the municipality`s legal experts. The project leader mistakenly thought that tendering with negotiations as a procedure was not allowed in this case.

The result turned out to be successful in many ways: implementation was done on time, and the cost was slightly less than expected. Not surprisingly, the municipality chose the same vendor for a later procurement, and except for a minor flaw, the vendor followed up well for a period. The process deteriorated when the vendor's contact person with the municipality left the company. The dialogue helped the procuring unit understand their requirements. Nevertheless, the project leader thought that the process itself was too costly and too demanding on the vendors.

Discussion

The research question we set out to examine was:

"*How can a public procuring entity follow the regulations and simultaneously procure the Information System best suited to their requirements?*"

To make sense of our data, it appeared to us that dialectic reflection was an appropriate lens for interpreting the findings. Before proceeding to discussing our findings, we briefly describe dialectics.

Dialectics

Dialectical reflection can be a means to understanding change processes in IS development (Bjerknes, 1991; Markus, 1983). Contradictions can be understood as opposites (thesis and antithesis), but not necessarily conflicts. A thesis consists of multiple assumptions, and failing any overt opposition, an organisation persists with a thesis (Sabherwal & Newman, 2003). An antithesis contains assumptions that are opposites to one or more of the assumptions constituting the thesis, and challenge the existing order (op. cit.). The opposing entities may be between different commitments for one group (e.g. procurement personnel) or between different stakeholder groups with contradicting goals.

Time can also be a significant factor in reducing conflicts. Cyert and March (1963) coined the phrase "sequential attention to goals" to show how attention to political goals may shift over time in response to perception of problems. In this way, inconsistent or conflicting goals may be resolved differently at different points in time.

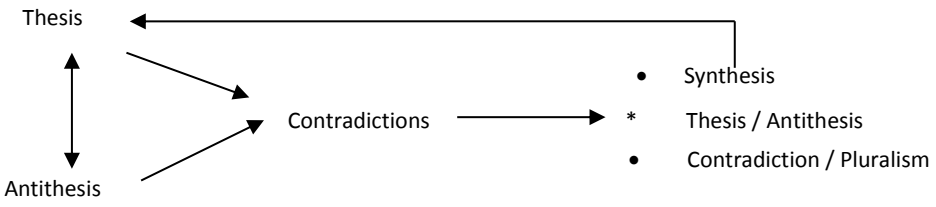

Figure 8: Dialectical process lens (adapted from Van de Ven and Poole (1995)).

The dialectical process (Figure 8) can result in three different outcomes: (1) the thesis or the antithesis prevails, (2) synthesis, which is a compromise between the thesis and antithesis or (3) no resolution, where the thesis and antithesis remain in a state of pluralism or conflict. A synthesis may in turn lead to a contradicting antithesis, which may set off another dialectical process.

Dialectics has been applied for studying development and implementation of enterprise content management systems (Nordheim & Päivärinta, 2006) and implementation of Enterprise Systems (Robey *et al,* 2002; Soh *et al,* 2003; Nordheim & Nielsen, 2008). In the context of packaged software procurement, dialectics revealed conflicts (Howcroft & Light, 2002), and application of power by technical consultants (Howcroft & Light, 2006). Dialectics has also been applied to understand contradictions in public procurement of information systems (Moe & Sein, 2014).

Analysis

When we cast a dialectic gaze on our research question, it manifests as a dialectic between the following thesis and antithesis:

> ***Thesis:*** *Abiding by the principles of the EU regulations on public procurement (openness and transparency, equal opportunities for all vendors)*
>
> ***Antithesis:*** *Obtaining the system which best meets a public entity's complex information requirements, irrespective of any constraints.*

Getting the system that best meets complex requirements usually requires some degree of dialogue with vendors throughout the process. The thesis essentially limits this. The antithesis, on the other hand, would tend to encourage such dialogue. Developing accurate requirements specifications is difficult when (a) a system is complex or unique and (b) when the procurement entity does not have adequate knowledge about the system. The two conditions can be related—the more unique or complex a system is, the less likely it is that many people will have the competency required.

Our cases reveal that public procurement entities deal with this dialectic by seeking a synthesis which can take two forms: they attempt to get their requirements right, either by selecting a tendering procedure that allows a degree of dialogue, albeit regulated, with the vendors or by learning through their formal or informal network of other public entities. There is also a possible third form, which is a combination of the two.

<u>Synthesis through selecting an appropriate tendering procedure</u>

In two of our cases, the procuring entity selected the most appropriate procedures. In case 2, the negotiations identified which requirements were actually met, and the ranking and selection were quite straightforward. The procuring entity was very certain of their decision, and there were no big surprises after implementation. However, it required a long time to develop detailed requirements specifications. In case 3, the dialogue helped the procuring entity to decide on their needs. The tendering process gave them enough information to make a decision. The project manager stated that the procedure was chosen so they could learn about the process. She felt, however, that the procedure required too much work and resources in terms of dialogue meetings and travelling for the vendors.

In case 1, however, the selected procedure was not appropriate, with hindsight. The entity struggled with getting the requirements on system integration. This was discovered only after implementation. A constant dialogue with the vendor, possibly through demonstration with real data, could have surfaced the issue earlier. The most appropriate procedure would have been tendering with negotiations. Instead, the procedure applied was restricted tendering. The procurement manager, though an experienced hand in the municipality, was new to procurement and this was his first procurement of information systems. We see that experience and competence of the procuring entity is a critical factor.

Synthesis through learning from networks

A second way for procurement entities to determine requirements when internal competency is lacking is by learning from formal and informal networks of similar entities. In our cases, we uncovered a rich seam of evidence about the use of a greater network of procurement experts who had access to an archive of requirements specifications that they were willing to share. This represents part of the context of procurement. These are coping mechanisms for managers in the face of increasing complex software systems and the many regulations governing systems acquisitions in the public sector. Together with the various processes the regulations permit, they can be seen as the syntheses in the dialectic between the regulations and the entity's need to acquire the best system. This

strategy requires less dialogue with vendors and hence allows stricter adherence to regulations.

Summary

Having stated our research question as dialectic, we posit that it is the antithesis that is of paramount importance to a public procuring entity. The entity's prime goal is to procure the best possible and most appropriate system that fulfils its requirements. Unlike a private entity, it cannot just go and purchase whatever system it believes is most suitable. A public entity is heavily regulated and has to follow strict rules and procedures. This makes acquiring a complex information system a challenge. Public entities adopt strategies to come to a synthesis. In our research, we unearthed two strategies: selecting the most appropriate tendering procedure, and learning from other procuring entities. On occasion (e.g. case 1), we find that, with hindsight, the entities have not chosen the best procedure. In other situations, we found that they would employ coping strategies to overcome the complexity they faced, such as borrowing requirements developed by other municipalities for similar systems.

If we trace the development of the allowed procedures, we can see that the EU is not oblivious to this dialectic. Starting with the strictest procedure, open tendering, there has been a gradual relaxing of the prohibition on interaction with the vendors. The procedures 'tender with negotiation' and 'competitive dialogue' are examples of this trend.

From 2016, the process will be regulated by a new directive. This allows for the same four procedures, but adds a new one: the innovation partnership, which can be awarded only after running a tender with negotiations (EU, 2014).This new procedure allows suppliers to develop construction works, supplies or services not currently available in the market, in long-term partnership with contracting authorities. In addition, the new directive allows "better use of public procurement in support of common societal goals".

The tendering procedures also have implications for specifying systems requirements. More interaction with the vendor means more opportunity for learning and discovery for the procuring entity. This is especially important in developing specifications. Essentially, then, the task of requirements specification becomes a collaborative effort between the

vendor and the procuring entity. There are obvious pitfalls here. More reliance on the vendor means more power to the vendor, leaving open the danger of exploitation. However, the long-term benefits of a sustained relationship are important for the vendor (see case 3).

Implications

Like any, our study has limitations. Our findings are from Europe, but the insights on the public procurement process can arguably be relevant to other parts of the world that have similar regulations. Our selection of the cases may have been skewed. In cases 1 and 2, the procuring entities took some time before deciding to allow us to follow their procedure. We can speculate whether procuring entities that are ready to bend the rules would allow researchers to follow their work closely. The processes were very clean, except for internal conflicts in case 2. We were careful to assure all respondents that the findings would be anonymised, and that the results from the interviews would not be disclosed to any of their colleagues. We were also careful to be as unobtrusive as possible when we attended the meetings. Still, there may have been some Hawthorne-effect, in the sense that the project groups in the procuring entities may have been more careful in abiding by the regulations because of our presence.

Nevertheless, interesting implications emerge from our study, both for practice and research. We elaborate below:

Implications for practice

Based on our findings, we propose a framework for selecting an appropriate tendering procedure (see table 3). Our framework is based on two dimensions: complexity in requirements and uniqueness of system.

Table 3: Framework for selecting procedures in the public procurement of IS

	Non-complex requirements	Complex requirements
Non-unique system	Borrow requirements specifications from other public entities. Appropriate procedures: Open tender or restricted tender	Learn from other public entities. Carry out dialogue with vendors to evaluate the systems. Appropriate procedure: Tendering with negotiations.
Unique system	Dialogue with vendors helpful. Appropriate procedures: Tendering with negotiations or competitive dialogue.	Dialogue with vendors essential. Appropriate procedure: Competitive dialogue

If requirements are not complex and the system is not unique, the procuring entity is likely to have internal competence to specify the requirements. If not, requirements can be "borrowed" from other public entities; however, they need to be tailored. The most efficient procedures are open or restricted tendering.

If requirements are complex but the system is not unique, or the procuring entity has limited competence, learning from the network of other public entities is an effective strategy. Dialogue with vendors may still be required to validate that the requirements are met; this calls for a procedure such as tendering with negotiations.

If requirements are not complex, but the system is unique, learning from other public entities is less likely to produce results. This requires more dialogue with the vendors. An appropriate procedure would be tendering with negotiation or competitive dialogue.

If requirements are complex and the system is unique, it is more likely that the procuring entity does not have internal competence and neither would other public entities. Consequently, dialogue with the vendors may be the only way, and the only procedure that allows learning from the vendors is competitive dialogue. Such projects are resource demanding on the vendors; thus, only large vendors can be expected to participate.

Implications for research

For research, several directions emerge for future studies. The obvious one is to validate our framework. In order to do so, we must first operationalise precisely what "uniqueness" and "complexity" of requirements means in systems to be procured. Case studies and a Delphi study of experts and procurement managers, followed by quantitative surveys, are possible approaches. A second direction is to study how procurement entities use and learn through their networks, and the challenges associated with following this strategy. Essentially, this strategy allows the units to define requirements of systems that they are not familiar with without relying on vendors. Whether this is a conscious effort to minimise their disadvantage vis-à-vis the vendor, in terms of information asymmetry, is an interesting question. In the same vein, whether information asymmetry is reduced through dialogue with the vendor is another intriguing question. As our cases indicated, there were several stakeholders associated with any procurement. This has the potential to raise conflicts because of conflicting stakeholder interests and goals. Moreover, goals may change over time and create shifting coalitions of stakeholders that may create problems for a smooth procurement. This can be a fruitful area for future research.

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Appendix A - Overview of interviews

Table A1: case 1

Subjects	Date	Medium	Duration
Super user*	23.10.12	Skype	34 minutes
Excluded vendor	05.02.13	Face-to-face	83 minutes
Winning vendor	08.03.13	Skype	52 minutes
Super user	13.05.13	Face-to-face	63 minutes
Project manager	13.05.13	Face-to-face	79 minutes
Project manager	20.06.14	Face-to-face	35 minutes
Super user, ERP system	30.06.14	Face-to-face	61 minutes
Procurement manager	01.07.14	Face-to-face	59 minutes

*Super user denotes a user assigned the role as an expert in his/her functional area, who trains and assists end-users, having the dual role as user and problem solver/trainer (Karuppan and Karuppan 2008).

Table A2: case 2

Subject	Date	Medium	Duration
Procurement project manager	10.09.12	Skype	11 minutes
Change project manager	19.09.12	Skype	21 minutes
User representative, ref. group	02.10.12	Skype	36 minutes
User representative, ref. group	02.10.12	Skype	20 minutes
User representative, ref. group	08.10.12	Skype	18 minutes
User representative, ref. group	08.10.12	Skype	22 minutes
Super user, “other” municipality	06.11.12	Skype	35 minutes

Procurement project manager	15.11.12	Skype	24 minutes (interrupted due to another meeting)
Procurement project manager	22.11.12	Skype	45 minutes (continuation from former interview)
Super user, legacy system	30.01.13	Face-to-face	56 minutes
Change project manager	30.01.13	Face-to-face	68 minutes
Winning vendor	11.02.13	Face-to-face	54 minutes
Procurement project manager	26.02.13	Face-to-face	46 minutes + notes
Procurement managers (two, at the same time)	26.02.13	Face-to-face	73 minutes
Super user, new system	23.09.14	Face-to-face	60 minutes
Change project manager	23.09.14	Face-to-face	59 minutes

Table A3: case 3

Subject	Date	Medium	Duration
Lawyer*	10.09.12	Skype	9 minutes
Project manager	26.10.12	Face-to-face	50 minutes
Super user, archiving	29.10.12	Face-to-face	48 minutes
Super user, backup services	29.10.12	Face-to-face	30 minutes
Project manager	13.11.12	Face-to-face	24 minutes
Losing vendor	04.02.13	Face-to-face	54 minutes
Winning vendor	24.05.13	Face-to-face	66 minutes
Project manager	15.11.14	Face-to-face	53 minutes

*The recording software did not work properly during this interview

Appendix B - Overview of internal documents

- Case 1: Four e-mails with notes from reference checks, twelve internal e-mails, minutes from four meetings, and the final requirements specification.
- Case 2: Plan of the procurement and of the change project and minutes from the first negotiation meeting.
- Case 3: Letter from the lawyer stating that competitive dialogue could be applied. Memos from two internal meetings. Instructions to vendors for the dialogue meetings. Question concerning the procedure from one vendor, which was answered and sent to all vendors. Final requirements specification. Offer from all vendors. E-mail sent to all vendors with a redacted offer from winning vendor, and ranking of all offered solutions and procurement protocol.