Implementing an Enterprise System: A dialectic perspective

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Implementing an Enterprise System:

A dialectic perspective

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Abstract

This thesis reports on a study of the process of implementing an enterprise system in an organization. The implementation process is viewed from a dialectic perspective which means thinking in terms of contradictions. This thesis raises the following research questions:

Q1. What are the main contradictions when implementing enterprise systems?
Q2. How can we understand contradictions in enterprise system implementations?
Q3. How can we constructively deal with contradictions in enterprise system implementations?

To answer these questions, an interpretive research approach was chosen. The main empirical part is a longitudinal case study of the implementation in an enterprise. The system was in this case an innovative combination of collaboration and information management technologies. Data collection and analysis occurred between 2003 and 2007. The data consisted of interviews and documents. In addition a vendor perspective has been explored through other case studies. Interviews were recorded and transcribed. The data analysis consisted of several iterations, with document analysis in parallel with interview analysis. This included deductive analyses based on the interview guides and inductive analyses of themes and categories occurring in the data.

To answer the first research question, the main contradiction found in this case was between an as-is implementation of standard software, and an implementation fulfilling the organizational requirements of solution integration and user experience. Termed a dialectic of adaptation in this study, the rest of this thesis focuses on the implication of this dialectic. The second research question is answered from three different perspectives. These are (i) a pre-implementation perspective, (ii) an early chartering phase perspective, and most important, (iii) a project phase perspective. From a project phase perspective, the dialectic of adaptation was emergent and occurred in combination with other drivers of change. The dialectic of adaptation is further understood on the basis of diverging viewpoints among user groups from different domains. The latter understanding constitutes a lead for answering the third research question.

The answer to the third research question came from a special role that was established in this case, called the corporate user representative. This was a key role in the dialectic of adaptation. Essential characteristics for this role are described in terms of two social actor dimensions, the interactions and identities dimensions.

In summary, this thesis contributes to understanding how the dialectic of adaptation may emerge as an enterprise system is implemented. This thesis further contributes by addressing how the dialectic of adaptation may be constructively dealt with in an enterprise system implementation. The answers provided to the three research questions of this thesis contribute both to the existing research literature on organizational implementation of enterprise systems, and to the practice of managing enterprise system implementations.

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1. Introduction

This is a PhD thesis that focuses on the process of implementing an enterprise system in an organization.

The primary motivation for this research on enterprise system implementation is twofold. First of all, enterprise systems (ES) are important, due to their complexity, scale and their promise to deliver seamless integration across enterprises (Davenport, 2000). Secondly, the process of implementing an ES in an organization is challenging, and large organizations typically spend large amounts of money on implementing ES (Seddon, 2005). Thus the importance and proliferation of enterprise systems, combined with the challenging task of implementing them constitutes the main motivation for this PhD research.

Another motivation is the context selected for this research. The main part of this thesis reports on the results of a longitudinal study of one ES implementation. The implementing organization is a major actor in the oil industry in Norway. Within this context, the type of enterprise system studied provides an interesting case. As the term enterprise system often gives a certain association, a clarification may be necessary at this point. This thesis focuses on an enterprise system that is different from Enterprise Resource Planning (ERP). The rationale is to study an enterprise system context that is less researched than the relatively mature domain of ERP, and rather focus on the implementation of an ES that is an innovative combination of technologies. The enterprise system studied here is a combination of collaboration and information management technologies. Both this system and ERP systems fit with the definition that enterprise systems are commercial software packages that enable the integration of transaction-oriented data and business processes throughout an organization (Markus and Tanis, 2000). ERP is thus a large subset of enterprise systems, and the system that is the object of study in this thesis is another subset of ES. Throughout this thesis the generic term enterprise system (ES) will be used, except when it is necessary to specify a certain subset of ES.

ES implementation involves many dimensions. Technical issues are numerous, and while laying them aside, the focus is here on organizational processes. The mainstream literature on ES implementation is teleological (Botta-Genoulaz et al., 2005), in the sense that it suggests that ES are to be implemented based on the strategic goals of the organization. However, this is not a straightforward process in practice (Lee and Myers, 2004). A problem with teleological assumptions is that the logic of the system may conflict with the logic of the business (Davenport, 1998).

This thesis follows an alternative to the mainstream teleological view of ES implementation. One such alternative approach to study ES implementation is applying a dialectic perspective. Dialectical thinking has been applied to study ES implementations, and has established that contradictions occur in ES implementations (Robey et al., 2002). This is also in line with proposals for information systems implementation research (Myers, 1994).

1.1. Problem statement

This thesis focuses on the process of implementing an enterprise system in an organization by applying a dialectic perspective. A dialectic perspective means thinking in terms of

contradictions surfacing in the implementation process. To do this, it is first of all necessary to establish if there are any contradictions. If contradictions surface in the process, it is necessary to focus on contradictions that are important for the study. The first research question is therefore formulated as follows:

Q1. What are the main contradictions when implementing enterprise systems?

The term "main contradictions" refers to the most important ones in the context of study. The focus of this research is the implementation process, not the implemented solution. To establish main contradictions in the ES implementation process may be useful, but the goal of this research goes further. After the main contradictions have been established, one needs to explore them further in order to understand them. One cannot afford a superficial understanding of contradictions as they may imply considerable complexity. To understand and explain main contradictions is a necessary prerequisite for being able to deal with them in a constructive way. The second research question is therefore:

Q2. How can we understand contradictions in enterprise system implementations?

Understanding contradictions would benefit from an exploration from several perspectives, to get as wide an understanding as possible. To understand the contradictions that surface may be useful in its own right. However, the usefulness of this research hinges on the extent to which it can contribute to address what can be done as contradictions surface. The ambition of this thesis is this further step: to focus on what is needed to be able to constructively deal with the contradictions that occur. Contradictions may be powerful drivers of change (Van de Ven and Poole, 1995) and if constructively dealt with, they therefore have a considerable potential for achieving change. This is an important reason for applying a dialectic research perspective. As an example, an ES project team's ability to manage multiple stakeholders with divergent interests is said to play a vital role in ES implementation success (Sarker and Lee, 2003). Addressing the issue of dealing with contradictions leads to the third research question:

Q3. How can we constructively deal with contradictions in enterprise system implementations?

Again the focus is on the implementation process, not on the implemented solution. The rest of this thesis provides several answers to these three questions. These answers came from studying the process of implementing an enterprise system in one particular organization.

This thesis is based on five publications. In order to understand the larger context of ES implementation, a vendor perspective on the theoretical basis for the ES technology has also been explored. To understand ES implementation in depth, a longitudinal case study of the implementation of an enterprise system has been carried out. The case represented a new combination of collaboration and information management technologies at the time of study, and was chosen to focus on a relatively new subset of enterprise systems that had not been researched so far. Following the data of the longitudinal case, contributions to the three research questions above have been presented in four of the five published papers. This thesis presents the outcome of the research and describes how the different publications fit together.

1.2. Structure of the thesis

This introductory chapter presents the problem, aim and scope of the thesis. Chapter 2 provides the background literature for the research questions raised. Chapter 3 describes the research approach in detail, including research design, data collection and analysis. The thesis is based on five publications, and an overview of the publications is presented in chapter 4, which summarizes the individual papers and their results. Based on these results, chapter 5 presents the overall contributions to theory and practice. Aimed at an academic audience, it specifies the literature to which this thesis contributes new knowledge. The conclusion in chapter 6 summarizes the contributions, reflects on limitations and indicates future research. A list of references in chapter 7 is followed by Appendix A, which contains the five publications that this thesis is based on. Appendix B contains interview guides from the study.

2. Theoretical perspectives on enterprise system implementation

The research questions raised in chapter 1 require a literature review to establish existing knowledge. That is the purpose of this literature review which is based on several iterations of search. There has been literature searches related to each publication in this thesis, and due to the long time span of this work, an extensive literature search and review was done in February 2008, prior to writing this chapter.

This final search combined the term "enterprise system" and each of the following keywords: implementation, adaptation, user representative, ECM, collaboration technologies, social actor, corporate user, user involvement, influence process, political skill, stakeholder, customer team, dialectic, dialectics, contradiction, user group, IT-user, customization, C/V, CRM and SCM. The following sources were used: Google scholar (15 first pages), Communications of the AIS, IEEE Explore, ISI/Web of Knowledge, EbscoHost (150 first on relevance), ACM digital library and Science Direct. In addition a search has been carried out for articles that have cited 20 of the most important publications used in this thesis. This cited references search used Google scholar, ISI/Web of Knowledge, and Science Direct.

The choice of theory has emerged during the research process. Theory has been selected as needed, based on the criterion that it should give insight to the phenomenon studied. This is quite common for interpretive research (Walsham, 2006). As the study evolved, different theoretical perspectives have therefore been applied. These different theoretical perspectives constitute the latter part of this chapter.

2.1. Enterprise systems

The term enterprise system (ES) has traditionally been related to ERP systems (Davenport, 1998). A definition of ES that reflects this historical basis in ERP is that they are commercial software packages that enable the integration of transaction-oriented data and business processes throughout an organization (Markus and Tanis, 2000). Enterprise Systems is still often used as synonymous with ERP (e.g. Davenport, 1998; Gulla, 2004; Nah and Lau, 2001; Strong and Volkoff, 2004), and ERP implementation has attracted considerable research attention (e.g. Esteves and Bohorquez, 2007). Although this research is on an ES different from ERP, most of the ES literature reviewed for this chapter deals with ERP. There are two reasons for this. Firstly, the main body of ES literature deals with the ERP domain, and is too important to be ignored. Secondly, both the enterprise system studied in this thesis and ERP systems fit with the definition of enterprise systems used here (c.f. chapter 1). ERP literature is therefore a major part of this review.

Since Davenport (1998) used the term, the ES concept has evolved beyond ERP to the extent that some would claim the ES definition is somewhat unclear within the literature (Loonam and McDonagh, 2005). In addition to ERP, the range of available enterprise systems is growing and includes customer relationship management (CRM), supply chain management (SCM) and enterprise portals (Ward et al., 2005). Another enterprise-wide system is enterprise content management (ECM) (Päivärinta and Munkvold 2005; Smith and McKeen, 2003), with an expected exponential growth in the next few years (Andersen, 2008). As part

of the ES studied in this thesis, ECM needs some explanation. ECM is an integrated approach to managing all of an organization's information, including strategies, processes, skills, and tools (Smith and McKeen, 2003). ECM integrates the management of structured, semi-structured, and unstructured information – and embedded pieces of software code – throughout the entire life-cycle of content production and utilization (Munkvold et al., 2003).

Enterprise systems are claimed to offer many advantages, such as cost savings, elimination of requirements definition and development processes, integration and standardization of business processes (Van Fenema et al., 2007). They promise to deliver seamless integration across enterprises (Davenport, 2000). The importance of ES may be illustrated by the fact that large organizations typically spend hundreds of millions of dollars on implementing ES (Seddon, 2005).

Enterprise systems may in a wide sense be viewed as a response to a need aptly summarized by Markus (1997), who stated that the world around us is demanding that we find ways to satisfy unique needs with generic software and components. Previously, information systems were built to fit an organization's practices. With the scale and complexity of ES, this is too expensive. Therefore ES has become a way to satisfy unique needs with generic software. This is no small challenge for organizations, as research on ES implementation has established (e.g. Soh and Sia, 2005).

One way to achieve the challenge to satisfy unique needs with generic software and components is by means of two fundamental design concepts which are a characteristic of most software packages. That is the distinction between commonality and variability (C/V) (Bühne et al., 2005). These two fundamental design concepts are also used by ES vendors (Leishman, 1999). The general meaning of commonality is properties shared by all members of a group, and in software engineering commonality is expressed as an assumption held uniformly across a given set of objects (Coplien et al., 1998). Commonality is designed as properties shared by all customers of an ES. Within an ES the designed commonality may include: common business processes, functions, workflows, screens, technical infrastructure layer, data models, and common default parameter settings (Leishman, 1999). Variability is generally understood as properties varying within members of a group, and may be viewed as an assumption true of only some elements of a given set of objects (Coplien et al., 1998). As an example, SAP's variability includes the organization model, the process model, the function model, the data model and subsequent table settings, and the user interface of screens and screen flows. It also includes interoperability with other programs, and the ABAP/4 programming environment (Leishman, 1999). Different vendors will, of course, reach very different decisions about the right balance between C/V (Davenport, 1998).

2.2. Enterprise system implementation

As most of the ES implementation literature is from the ERP domain, this is also reflected in the following literature review. ES represent a complex undertaking to implement in organizations (Markus et al., 2000; Gulla, 2004), and many implementations have been classified as failures because they did not achieve predetermined corporate goals (Umble et al., 2003). The software is only a fraction of the total cost (Seddon, 2005; Strong and Volkoff, 2004). Vendors recognize that most organizations require considerable consultancy support to adapt a supposedly ready-made solution to the implementing organization, or to adapt their

organization to fit the system (Wagner and Newell, 2007). Customization and implementation of ERP systems therefore has become an industry of its own (Scheer and Habermann, 2000).

An ES implementation is a sizable organizational change project (Strong and Volkoff, 2004), to the extent that it is described as technological-driven organizational change, or technochange (Markus, 2004). Thus an open perspective on organizational change is appropriate, and to this end an extensive cross-disciplinary review by Van de Ven and Poole (1995) was found useful. Based on a literature review, they arrived at four generic but distinct developmental theories to explain organizational change: teleology, life cycle, evolution, and dialectics. To understand the implementation process of the ES studied in this thesis, Van de Ven and Poole's (1995) four metatheoretical motors of development and change have been applied in the analysis. They are described in the following.

2.2.1. The teleological motor of change - a mainstream view of ES implementation

The mainstream literature on ES implementation suggests that they are to be developed and evaluated based on the strategic objectives of the organization (Lee and Myers, 2004). This is also known as a teleological view of change, that change is the result of purposeful cooperation, and includes goal formation, implementation, evaluation, and modification (Van de Ven and Poole, 1995). In this view, change focuses first on rational observation of problems. Then goals for change are set to respond to the observed issues, and development initiatives relevant to the goals are taken. The success or failure of results can then be assessed according to the goals (Van de Ven and Poole, 1995). Viewed in a positivist perspective, ERP implementation is not necessarily easy, but can be planned and directed towards goals set, and will create a new order in the organization (Kræmmergaard et al., 2003). Implementation failure is thus the result of insufficient planning or poor project management (ibid).

Critical success factors (CSFs) are part of a teleological view (Butler and Fitzgerald 1999, Fortune and White, 2005), and the mainstream literature on ES implementation is teleological (Botta-Genoulaz et al., 2005, Dery et al., 2006). Much of the current literature has contributed to assembling lists of perceived CSFs necessary for ES project implementation (e.g. Al-Mashari et al., 2003, 2006; Brown and Vessey, 1999; Finney and Corbett, 2007; Kirchmer, 1999; Nah and Delgado, 2006; Scheer and Habermann, 2000; Somers and Nelson, 2001, 2004; Wang et al., 2008). Although CSFs have been used as guidelines for ES projects, their applicability depends on the context and the goals and scopes of the projects (Gulla, 2004).

A problem with teleological assumptions is that the logic of the system may conflict with the logic of the business (Davenport, 1998), and thus misalignments are common between the functionality offered by the package and that required by the organization (Liang and Xue, 2004; Sia and Soh, 2007; Scott and Vessey, 2002; Wei et al., 2005). The adopters of an ES often adjust the organization's ways of working to fit the package, because modifying packages has numerous negative consequences (Markus and Tanis, 2000). The critics of the teleological view also address that plain focus on goals regards an ES implementation process as a black box and ignores the fact that the strategies and goals may change on the way (Robey et al., 2002; Lee and Myers, 2004).

2.2.2. The life-cycle motor of change

The life-cycle motor views change as the result of a prefigured organizational program that prescribes a sequence of phases (Van de Ven and Poole, 1995). Each phase contributes to the final product, and must occur in a prescribed order. Typically, different phases of a life-cycle model have different characteristics, which explain issues of change and development. Any organizational change such as the implementation of an information system involves a window in time, a life-cycle, during which systems are to be developed, used, and finally terminated. Various organizational programs of change have life-cycles of their own, which may be more or less synchronized with the life-cycles of the others (Van de Ven and Poole, 1995).

From the perspective of the life-cycle motor of change, an enterprise system implementation comprises a sequence of iterative stages. The life-cycle perspective is quite frequently used in ES implementation research (e.g. Al-Mashari et al., 2006; Wei et al., 2005) and also in combination with a teleological perspective (e.g. Aloini et al., 2007; Nah and Delgado, 2006). Such combinations of the ideal types of motors of change into composite models are possible (Van de Ven and Poole, 1995).

A life-cycle model quite common for conceptualizing ES implementation projects is the enterprise system experience cycle model proposed by Markus and Tanis (2000). This model consists of four phases: (i) project chartering, (ii) project phase, (iii) shakedown and (iv) onward and upward phase. Key activities of the chartering phase include building a business case, identifying a project manager, and adopting a budget and schedule. Selecting integration solution and vendor(s) may also be part of this phase, or it may be deferred until the project phase. Key activities of the project phase include current and/or future business modelling, software configuration, system integration, testing, data conversion, training, rollout and start-up. Key activities of the shakedown phase include bug-fixing and rework, system performance tuning, process and procedural changes, retraining, and staffing up to handle temporary inefficiencies. The onward and upward phase focuses on achieving results, maintaining the system, supporting the users, upgrading technology, and maintaining an innovative attitude for the future. Within these four phases, the implementation of an ES can be regarded as an on-going process of organizational learning and change (Markus and Tanis, 2000).

A critique of life-cycle models is that they offer more description than explanation. They do not provide an understanding of the underlying process, and tend to assume that stages follow a necessary sequence (Robey et al., 2002).

2.2.3. The evolutionary motor of change

An alternative view of organizational change is the evolutionary motor, which views change as the result of cumulative changes due to competition for scarce resources (Van de Ven and Poole, 1995). It focuses on repetitive processes of variation, selection and retention among organizational entities. Change at the level of the organization progresses due to actions launched in order to respond to the needs of smaller-scale entities within the organization, which then altogether change the organizational ecology over time (Van de Ven and Poole, 1995).

The evolutionary motor is barely applied in ES implementation research, and then mainly mentioned to describe development of ERP software by vendors (Kumar and Van Hillegersberg, 2000).

2.2.4. The dialectic motor of change

The dialectic motor views change as the result of contradictory values competing for domination (Van de Ven and Poole, 1995). Dialectics is a way of thinking that is based on contradictions. A contradiction can be viewed as a relation between two opposite aspects of a phenomenon, called thesis and antithesis; where antithesis is the negation of the thesis. The two aspects of a contradiction are intrinsically related, yet opposite and distinct from one another, and one aspect in a contradiction cannot be fully understood without considering the other (Van de Ven and Poole, 1995). In dialectical theory, stability and change are explained by reference to the balance of power between the two opposing entities. A thesis (A) may be challenged by an antithesis (Not-A), and the resolution of the conflict becomes a synthesis (which is Not Not-A). By its very nature, the synthesis is a novel construction that departs from both the thesis and the antithesis. This synthesis, in turn, becomes a new thesis as the dialectical process continues. However, a contradiction does not necessarily result in a new synthesis with a novel idea. An observed contradiction may continue in the organization, maintaining the pluralist or conflicting status quo, or it may result in survival of the thesis or antithesis alone. Dialectics is about dynamics, and is one way of explaining development and change (Van de Ven and Poole, 1995).

In more general terms dialectical reflection is a way to understand a situation (Bjerknes, 1992; Israel, 1979). Explicit thinking in terms of contradictions constitutes the key element of a dialectic view (Mathiassen and Nielsen, 1989). According to Dahlbom and Mathiassen (1993), contradictions can in some cases surface as trade-offs, which are manifestations of contradictions inherently related to the use and development of computer systems. To apply dialectical reflection is a way to understand and explain organizational change by applying an important type of process theory (Van de Ven and Poole, 1995).

Dialectical theory provides insights into IS development, but it does not treat the relationships between organizations and IS as determinate, causal connections. Instead, it examines them as emerging through social constructions by individuals and groups (Sabherwal and Newman, 2003). The mutual adaptation process between the technology and the organization is far from a planned change, and the outcomes of the process are difficult to predict (Wei et al., 2005). Therefore a technologically deterministic depiction of ERPs, advanced by consultants and vendors, amounts to little more than a false promise (Grant et al., 2006). The following section describes how dialectical reflection has been applied in previous ES implementation research.

2.3. Contradictions in the ERP implementation process

In view of Van de Ven and Poole's (1995) four metatheoretical motors of organizational development and change, teleological and life cycle thinking has been found to dominate the ES implementation literature reviewed above. Taking the limitations of the teleological and life-cycle assumptions into account, there is a smaller stream of research on ES implementation that applies a dialectic perspective (Besson and Rowe, 2001; Robey et al.,

2002; Soh et al., 2003). These are studies of ERP, and they establish implementation challenges that emphasize the need for a wider perspective than the teleological and life cycle assumptions.

One contradiction in ERP implementation is termed a dialectic of learning (Robey et al., 2002). The dialectic of learning occurs between the old knowledge embedded in business processes and practices associated with legacy systems and the new business processes and practices that ERP is designed to support. To learn to utilize ERP, a company needs to overcome two types of knowledge barriers: (i) configuration of the ERP package, and (ii) assimilation of new work processes. Thus, ERP systems typically require organizations to forget large portions of what they already know about their existing technical infrastructures and business processes. The synthesis of this contradiction often results in a learning process and in alternative strategies for implementation (Robey et al., 2002). To deal with these contradictions, strong core teams and carefully managed consulting relationships addressed the configuration knowledge barriers. User training along with a phased implementation approach helped firms to overcome assimilation knowledge barriers (Robey et al., 2002).

Another research on ERP contradictions is Besson and Rowe's (2001), who combine three theoretical lenses to analyze ERP development projects. They use the ES experience cycle model (Markus and Tanis, 2000) as a framework to organize their observations. Furthermore, they argue that during the chartering phase a deterministic vision dominates the perceptions of decision-makers based on a few general-level strategic statements, without considering much the design of governance, work structures or the actual change strategy or socio-technical risks involved (Besson and Rowe, 2001). During the project phase, the designers and external consultants come closer to the organizational imperative view when they customize the system and make integration/differentiation choices. Unlike the chartering phase that focuses on general-level issues, the project phase involves numerous detailed technical choices within a very limited time. During and after the shakedown phase, targeted organizational outcomes are often not realized because of job and governance conflicts among the users and other stakeholders. Stakeholders may encounter changes in their work and find that they possess redundant information or processes whose governance needs to be decided. Hence, the dialectical view often dominates the shakedown phase, even if the change process was assumingly teleological in the chartering and project phases (Besson and Rowe, 2001). Contradictions in the shakedown phase emerge as conflicts between designers and stakeholders concerning task, resources and governance. One way to deal with these contradictions is by management of user participation in ERP, to involve users as an enactment process (Besson and Rowe, 2001).

Another stream of research has focused on ERP misfits by applying a dialectic conceptualization (Soh et al., 2003; Soh and Sia, 2004; Soh and Sia, 2005; Sia and Soh, 2007). According to this research stream a misfit emerges between the features of an ERP package and the specific requirements of an organization adapting the package. This misfit between the ERP's structures and the structures of the implementing organization may be solved either by modifying the package or changing the organization (Soh and Sia, 2004; Soh and Sia, 2005). The level of software adaptation includes a range of implementation options, such as described by Luo and Strong (2004), and may vary from full customization (or technology adaptation) to "out-of-the-box" implementation and maintenance. The latter often requires organizational adaptation to technology (Davenport, 1998). The misfits were discovered as the result of a dialectic analysis. To deal with these contradictions (or misfits), change management is important, so that an appropriate resolution of package–organisation

misalignment may emerge from interaction among the various implementation stakeholders (Soh and Sia, 2004). Three steps are suggested to avoid misalignments: (i) identify misalignments and appropriate solutions early, (ii) know the questions to ask to uncover misalignments, and (iii) take steps to increase the quality of misalignment identification and assessment (Soh and Sia, 2005).

Contradictions in the ERP implementation process may also continue in the form of workarounds (Soh and Sia, 2004) and avoidance of the implemented system by users. Moreover, the organizational environment and strategies may change during long ERP implementation processes (Lee and Myers, 2004) and may, in the worst case, lead to a situation in which a rigid technology implementation even betrays the dynamic needs of the organization (Hanseth and Braa, 1998).

The dialectic stream of ERP research presented above establishes implementation challenges that emphasize the need for a different perspective in addition to the teleological and life cycle assumptions. Based on the findings of this stream of research, this thesis therefore applies dialectics to analyze ES implementation. As this thesis focuses on an enterprise system that is different from ERP, the study will also indicate whether dialectics applies to other enterprise systems.

2.4. Stakeholders in ES implementation

In a dialectic perspective stakeholders are important, since multiple stakeholders with divergent interests can play a vital role in ES implementation success (Boonstra 2006; Sarker and Lee, 2003). Without going into the body of general stakeholder theory (e.g. Freeman, 1984; Donaldson and Preston, 1995; Mitchell et al., 1997), ES implementation can be perceived as a negotiation process where various parties try to use the project to defend or to advance their individual or group interests (Boonstra, 2006). Therefore value conflicts occur between stakeholders in ES implementation processes (Allen, 2005). An ES entails many stakeholders who typically have multiple and often conflicting objectives and priorities, and rarely agree on a set of common aims (Sedera et al., 2004). Previous research addressing users in an ES context includes findings such as ERP value conflicts between stakeholders (Allen, 2005), users' role in ERP parameter settings (Besson and Rowe, 2001), and power issues with the procurement of a CRM package (Howcroft and Light, 2006). To deal with such contradictions, it is important to identify value conflicts between functional areas (Allen, 2005).

The ways in which stakeholder groups resolve or reconcile their different interests affects ES implementation success (Besson and Rowe, 2001). Understanding ES implementation from a stakeholder perspective is still lacking, even within the relatively well research domain of ERP (Esteves and Bohorquez, 2007). Since multiple stakeholders are fostering contradiction (Clegg et al., 2002), stakeholders are an important perspective to be able to deal with contradictions. In ERP projects, successful implementation is due in part to the management of user participation (Besson and Rowe, 2001). A project champion role performs the crucial functions of transformational leadership, facilitation, and marketing the project to the users (Somers and Nelson, 2004). Key activities of the ERP champion role include management of expectations, interdepartmental communication and cooperation, and minimal customization (ibid).

Although an ES affects many types of users throughout the organization, only a low proportion of affected users have opportunities to participate (Markus and Mao, 2004). Changing contexts such as ES are therefore said to require new research on user participation and in particular single-context studies (ibid).

To summarize the literature on stakeholders in ES implementation, there are several issues related to research question Q3 of chapter 1:

- management of user participation
- value conflicts between functional areas
- possible misalignment emerging from interactions among stakeholders.

These issues have been used to focus research question Q3, and to answer this question a further review of literature beyond ES implementation was considered necessary. This literature is presented in section 2.5.

2.5. Dealing with contradictions: Literature used in the study

Based on the focus for research question Q3 that emerges from the literature review above, this section describes concepts related to management of user participation, value conflicts and interactions among stakeholders. This literature is later used in publications that provide an answer to research question Q3, how to deal with contradictions.

2.5.1. Users as social actors

To describe users and their representatives in an ES context, the multidimensional concept of a social actor (Lamb and Kling, 2003) is chosen. The social actor concept is based on roles and interest groups, and denotes a professional capable of mobilizing change. According to Lamb and Kling (2003) users are better understood as organization members whose ICT-related actions can be characterized along four dimensions. Later Lamb (2006) added a fifth dimension called temporalities. These social actor dimensions are summarized in Table 1. The multidimensional view of a social actor enables IS researchers to address the social actor as an organization member who is representing the interests of the firm or department (Lamb and Kling, 2003).

Dimension	**Description**
Affiliations	Organizational and professional relationships that connect an organization member to industry, national and international networks
Environments	Stabilized, regulated and/or institutionalized practices, associations, and locations that circumscribe organizational action
Interactions	Information, resources, and media of exchange that organization members mobilize as they engage with members of affiliated organizations
Identities	Avowed presentations of the self and ascribed profiles of organization members as individual and collective entities
Temporalities	Socially constructed segmentations of time that shape the interactions of an organization member in response to the expectations of networked affiliates

Table 1. Social actor dimensions (Lamb and Kling, 2003; Lamb, 2006)

2.5.2. Participation

Theory supports the desirability of user participation in systems development (Lynch and Gregor, 2004). User participation in the context of systems development is said to be one of the most researched topics in the IS literature (e.g. Gallivan and Keil, 2003; Wang et al., 2005).

In the context of systems development, end user representatives are said to have a most challenging and demanding role (Damodaran, 1996). Such user representatives need a high level of interpersonal and communication skills, the ability to acquire technical knowledge in diverse areas, the ability to persevere in difficult circumstances, the ability to sustain a strong sense of mission, and patience. In systems development the developers' role is active, which implies that in a user-developer communication process, developers receive and interpret messages from users, and developers set priorities and take action (Gallivan and Keil, 2003).

To revitalize participation as an important area of IS theorizing and research, Markus and Mao (2004) outline key elements of a theoretical framework for IS participation. This theory distinguishes between stakeholders, participants and change agents. Stakeholders are likely to be affected by a solution, while participants are the subsets of stakeholders who are actually given the chance to participate in implementation activities. Change agents are people who play important roles in designing and executing participation opportunities for stakeholders. Participation activities may be divided into different types, e.g. solution design, solution implementation, and project management. Participation richness is another concept in this theory, i.e. the extent to which the participation activities are meaningful and enable participant influence (Markus and Mao, 2004).

2.5.3. Power and influence

Information Systems (IS) development and implementation has long been characterized as a highly political process (Grover et al., 1988; Kling and Iacono, 1984). Although power is crucial in the interplay between information systems and organization (Baskerville and Smithson, 1995), the study of power is said to have been marginalized in IS research in the last 20 years (Howcroft and Light, 2006).

ES stakeholders often have conflicting objectives and priorities (Sedera et al., 2004), and users and their relative power is an issue in the context of ES, as the dialogue between users and designers is important (Besson and Rowe, 2001). Since users rarely are involved in the decision to launch the project, this gives rise to conflicts (Besson and Rowe, 2001). Users are given more attention in the shakedown and onward and upward phases (Markus and Tanis, 2000). There is a fine balance of power to be maintained between the stakeholder groups in order to achieve a harmonious outcome (Skok and Legge, 2002).

However, power in IS contexts is a complex phenomenon that best can be viewed and understood as consisting of multiple layers (Jasperson et al., 2002). The theory of organizational influence processes (Porter et al., 2003) is chosen here, because this theory has a particular focus on how power is applied.

2.5.4. Organizational Influence Processes

In the theory of organizational influence processes, there is a distinction between power and influence. Power is viewed as a resource of force, whereas influence is the actual application of that force (Porter et al., 2003). Organizational influence processes are networks of social actions that an individual or group enacts to influence another individual or group to accomplish the originator's goals. Influence processes are found in all organizational activity and are necessary to attain what a formal organization cannot (Porter et al. 2003).

Porter et al. (2003) divide power into two subsets: position power and personal power. Position power consists of reward power, coercive power and legitimate power, while personal power consists of referent power and expert power. Legitimate power is based on the target's belief that the influence originator has the right to issue directives, usually related to position. Referent power is based on the psychological identification of the target with the agent of influence, and an extension of this is charismatic leadership.

Dependence between organizational actors is a key to the notion of power and influence (Kotter, 2003). The more the target depends on the originator, the greater the influence the originator can have on the target. The power base may be direct or implicit and may include obligation, expertise, identification and persuasion (Kotter, 2003). The utilization of power is inherently situational, and an influence episode is a social event. It is the relationship between the influence originator and the target that determines the possible influence processes. There are in general nine influence tactics available: rational persuasion, inspirational appeal, consultation, ingratiation, exchange, personal appeal, coalition, legitimating and pressure (Yukl and Tracey, 2003).

The framework of Porter et al. (2003) defines three common direct influence processes, namely: downward, lateral and upward (Figure 1). Downward influence means that the influencer is at a relatively higher organizational level than the potential target. Formal authority is important, but just as other means of influencing may often be more effective, then formal authority may prove ineffective (Kerr, 2003; Goleman, 2003).

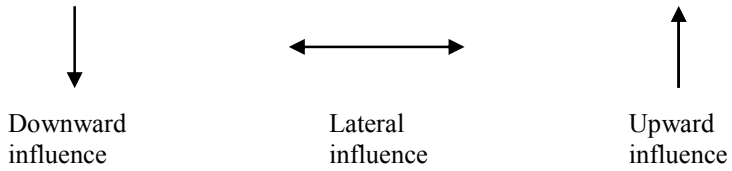

Figure 1. Three common direct organizational influence processes

Lateral influence means that the two parties involved do not have a clear and unambiguous hierarchical difference between them. Neither party is in a position to use formal authority over the other. Potential lateral influencers are likely to use expert and reference forms of power, but rewards or punishments may also play a role. The influence target often has a clear choice in how to respond, and can be quite active in supporting or defeating an influence attempt (Cohen and Bradford, 2003; Ferris et al., 2000).

Upward influence is directed at a target in a position that is higher in the formal hierarchy than the influence agent. This limits the repertoire of influence methods and tactics that the subordinate may reasonably employ. The influence originator needs to rely more on personal

bases of power such as expertise or charisma, or may need to resort to persuasion or even manipulation. Of four upward influence strategies, two are successful: ingratiator, a friendliness strategy; and tactician, a reason strategy (Kipnis and Schmidt, 2003).

2.5.5. Political skill

Due to the complexity of managing multiple stakeholders with divergent interests in ES implementation processes (Boonstra 2006; Sarker and Lee, 2003), an interesting type of social skill that may be relevant is termed political skill (Ferris et al., 2000). This is an interpersonal style that combines social astuteness with the ability to relate well. People who practice this skill behave in a disarmingly charming and engaging manner that inspires confidence, trust, sincerity and genuineness. Political skill is specific to interactions, and is aimed at achieving success in organizations (ibid).

Political skill is not a single trait or skill. Rather, it reflects an integrated composite of internally consistent and mutually reinforcing and compatible skills and abilities that defies precise description. It is a style-type of component, a way of putting thoughts into words. Another feature of political skill relates to how people accumulate forms of personal, non-financial capital. Individuals with social skill invest in the development of their reputations (Ferris et al., 2000).

2.5.6. Dealing with contradictions: A summary of the literature used

The reviewed literature raises issues related to management of user participation, value conflicts and interactions among stakeholders (section 2.4). With a focus on these issues, the third research question of chapter 1 represents a dimension of interaction with users that so far has not been adequately addressed by previous research. To answer this question (Q3), how to constructively deal with contradictions in ES implementation, the following theoretical perspectives have been used in the publications of this thesis:

1. The multidimensional concept of the user as a social actor
2. The application of power, through the theory of organizational influence processes
3. The concept of political skill.

2.6. A summary of the literature's contributions to the research questions

To conclude this literature review, the dialectic perspective is one way to view the organizational change that occurs in an ES implementation process. Based on the ES implementation literature reviewed, a summary of how this literature contributes to the research questions is presented in Table 2. The contributions in Table 2 are given corresponding numbers to show how the contributions interrelate, e.g. (No. 1) a dialectic of learning (Q1) can be understood as old knowledge versus new knowledge (Q2) and may be dealt with by strong core teams and carefully managed consulting relationships (Q3).

Table 2 shows that the literature, which is from the ERP domain, provides some answers to questions Q1 and Q2. Apart from the dialectic of learning, contradictions may largely be understood on the basis of conflicting priorities between stakeholders. Although the literature provides focus areas for question Q3, the question is far from resolved in the existing literature. Thus Table 2 also illustrates the need for this PhD thesis, to provide answers to the question of how we can deal with contradictions in enterprise system implementations.

Research question	**Contributions from the literature**
Q1. What are the main contradictions when implementing enterprise systems?	1. A dialectic of learning (Robey et al., 2002) 2. Conflicts between designers and other stakeholders (Besson and Rowe, 2001) 3. Package-organization misalignments (Soh and Sia, 2003)
Q2. How can we understand contradictions in enterprise system implementations?	1. Old knowledge versus new knowledge, associated with the configuration of the ES package, and with the assimilation of new work processes (Robey et al., 2002) 2a. Conflicts are emerging in the shakedown phase, as task conflicts, job/resource conflicts and governance/power conflicts (Besson and Rowe, 2001) 2b. Contradictions may be understood as conflicting objectives and priorities between stakeholders (Allen, 2005) 3. Misalignments may be understood as misfits between structures in the ES and in the organization. The structural forces embedded in the ES generates tensions between integration and differentiation, flexibility and restrictiveness, process-orientation and functional specialization, and conflicts between package—organizational domain specificity (Soh and Sia, 2003)
Q3. How can we constructively deal with contradictions in enterprise system implementations?	1. Strong core teams and carefully managed consulting relationships addressed configuration knowledge barriers. User training along with a phased implementation approach, help firms to overcome assimilation knowledge barriers (Robey et al., 2002) 2a. Management of user participation in ES, to involve users as an enactment process where social actors interact (Besson and Rowe, 2001) 2b. Identify value conflicts between functional areas (Allen, 2005) 3. Change management (Soh and Sia, 2003), so that an appropriate resolution of package–organisation misalignment may emerge from interactions among the various implementation stakeholders (Soh and Sia, 2004). Three steps to avoid misalignments: (i) identify misalignments and appropriate solutions early, (ii) know the questions to ask to surface misalignments, (iii) take steps to increase the quality of misalignment identification and assessment (Soh and Sia, 2005).

Table 2. A summary of contributions to the research questions from the literature

3. Research approach

As stated in chapter 1, this thesis addresses three research questions that focus on obtaining an understanding of contradictions and how to deal with these when implementing an enterprise system. The literature reviewed in chapter 2 established existing knowledge related to these research questions, and this chapter describes the research approach chosen to answer these questions. After a presentation of the research design, this chapter describes a longitudinal case study with data collection and analysis activities. A study of mini cases is then described, and this chapter concludes with a discussion of validity issues.

3.1. Research design

The literature reviewed in chapter 2 shows that dialectics is a relevant way to examine the enterprise system implementation process. The reviewed literature establishes that contradictions emerge through social interaction between individuals and groups. This implies that the phenomenon under study fits with an assumption underlying interpretive research methods. An assumption of interpretive research is that that our knowledge of reality, including the domain of human action, is a social construction by human actors (Walsham, 2006). Because the phenomenon under study fits with interpretive assumptions, an interpretive research approach has been chosen. The three research questions raised in this thesis are based on this assumption, that the phenomenon of contradictions in an enterprise systems implementation process may be analyzed as a social construction by human actors. In this perspective, the organizational implementation of an ES may to a large extent be viewed as a socially constructed reality.

The knowledge interest of the research questions is mainly one of understanding. This fits with an interpretive approach, as illustrated by Braa and Vidgen (1999) in Figure 2. From this knowledge interest follows that an appropriate research approach is a soft or interpretive case study (Figure 2). An interpretive case approach as described by Walsham (1995, 2006) is therefore the basis for this research approach.

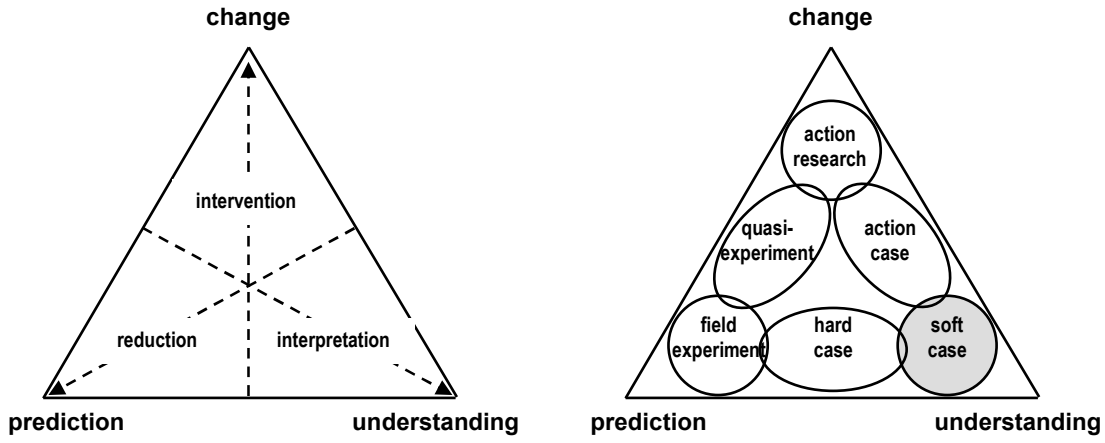

Figure 2. An information systems research framework for the organizational laboratory, with corresponding research methods (from Braa and Vidgen, 1999)

The process of implementing an enterprise system in an organizational context takes considerable time, and to understand how this process unfolds over time, a longitudinal study has been viewed appropriate. The research approach has therefore also been guided by Pettigrew's (1995) advice on longitudinal research on change.

The research is framed in a dialectic perspective. To apply a dialectic view implies to some extent a combination of interpretive and critical elements (Myers, 1994). This study has been mainly interpretive. The only critical elements used are those that come from applying a dialectic perspective on the implementation process, i.e. an explicit focus on contradictions, guided by the research questions of chapter 1.

3.2. Overview of research activities

This PhD research project has been an iteration between literature reviews and empirical studies. An overview of the research activities in the project is presented in Figure 3. The numbers in Figure 3 relate the activities to the five publications resulting from the study and presented later in this thesis. As Figure 3 shows, the longitudinal case study of Statoil is the basis for four publications (No. 2-5), while one publication (No. 1) is based on mini cases. Figure 3 also illustrates the iteration between literature reviews, problem definition and empirical studies.

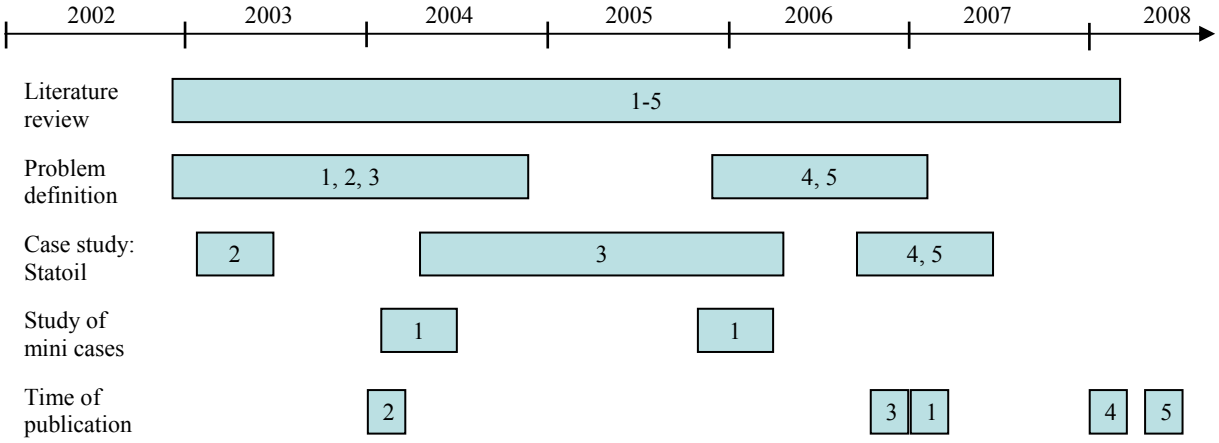

Figure 3. Overview of the research activities of this thesis, the numbers refer to the publications in Appendix A

3.3. Longitudinal case study: Statoil

Statoil[1] is a technology-based international energy company that primarily focuses on upstream oil and gas operations. Statoil's headquarters are in Norway, and the largest shareholder is the Norwegian state with a majority of the shares. The company is the third largest exporter of crude oil in the world, with approximately 25,600 employees in 33 countries in 2006. The company operates 60% of all Norwegian oil and gas production. The

[1] This case study was completed prior to the merger with Hydro's oil and gas in October 2007. The company is now known as StatoilHydro.

company consisted in 2006 of seven business units, headed by executive directors who reported to the CEO. Each business unit had an IS/IT manager.

Statoil was one of the world's largest users of Lotus Notes/Domino in the 1990s (Munkvold and Tvedte, 2003). The IT architecture evolved into a partly overlapping portfolio of technologies, scattered over a number of different storage media and applications. This caused major challenges related to information retrieval, version control and information quality (Munkvold et al., 2003), as Statoil's volume of information objects grow at a rate of about 300,000 per month. In response, Statoil's corporate IS/IT service launched a major Enterprise Content Management (ECM) and collaboration development program in 2002. The project objectives included collaboration and information sharing across organizational and geographical boundaries, with access to corporate information. Each employee in Statoil is attached to team sites to conduct their knowledge work and collaboration. All relevant information for a project or team is accessible to the team sites, with all documents being managed throughout their life cycles.

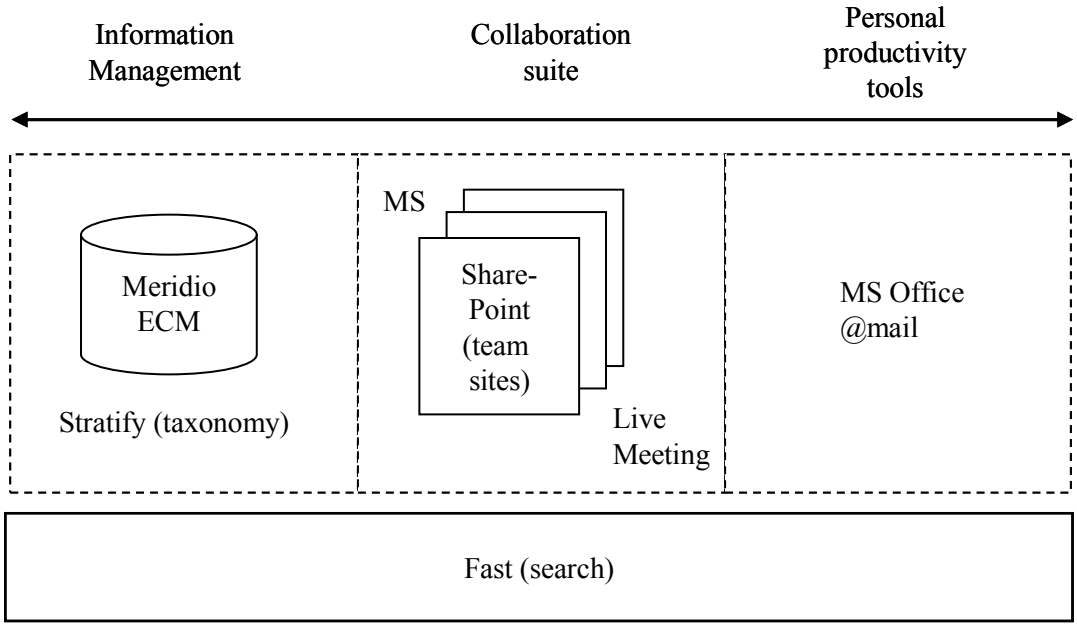

Figure 4. An overview of the solution with the main software products that constitute the ES technology

The technologies that constitute the enterprise system are summarized in Figure 4. Important software for the solution's information management is Meridio enterprise content management (ECM) combined with Stratify content classification (taxonomy) software. This is closely integrated with the FAST Search and Transfer software (Figure 4). Microsoft (MS) SharePoint portal server combined with Microsoft Live Meeting constitute important collaboration software, and personal productivity tools include Microsoft Office. As Figure 4 illustrates, the solution spans a wide range of technologies that are integrated. Statoil employees and partners use personal productivity tools to collaborate in the team sites, and their information objects are managed in a way that is transparent to the user. For example, as a user pushes the "store" button in Word, a cascading series of information management events take place in the background. Taken together, the team sites, corporate-wide integrated storage and search engines provide a powerful information environment, to be accessed through a corporate portal. The case is therefore a complex ES solution, based on a

combination of technologies. For Statoil, this ES implementation project is an effort comparable to their ERP implementation in the 1990s.

The project was organized with the CIO as sponsor, a steering committee, a project group with a project manager, and a reference group with representatives from the business units (Figure 5). The corporate user representative role is shaded in Figure 5 as this turns out to be an important role in the project. The role's importance means that it is given a considerable focus in this research. In addition to the illustration in Figure 5, there was a quality assurance group, and a solution handover group. The reference group discussed user requirements and user acceptance. The steering committee consisted of process owners and IS/IT managers from different business units having a customer role. The sponsor represented corporate management, was financially and commercially responsible, and chaired the steering committee. The project group was staffed by corporate services IS/IT. Vendor and other consultants were involved as needed, but Statoil staff did a major part of the work. Informants came from the project group, steering committee, corporate user representatives, reference group and quality assurance group.

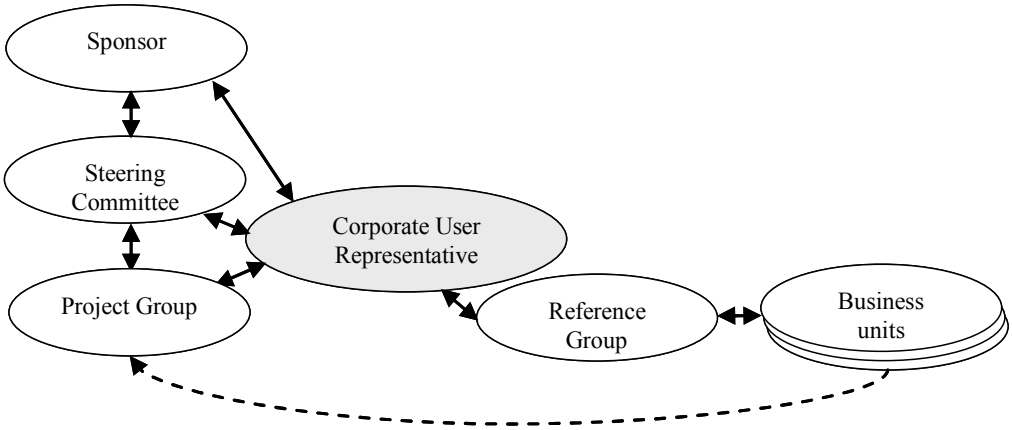

Figure 5. Some important actors in the ES implementation project (from publication 5)

There are two main reasons for selecting this case:

1. The case is likely to provide a good setting for answering the research questions Q1-Q3 of chapter 1.
2. It represented initially an innovative combination of new technologies, and is an interesting object of study as no previous research has focused on the implementation of these technologies. With a few exceptions, previous enterprise system implementation research is based on studies of ERP (c.f. chapter 2).

3.3.1. Data collection

The ES implementation project lasted from 2002 to 2007 and has been studied from an outside observer viewpoint in three distinct periods of data collection and analysis. The time frame of the project together with the three periods of research activities are outlined in Figure 6. Above the time line in Figure 6 are the main project phases, and below the time line are the three phases of my longitudinal case study (c.f. the Statoil case in Figure 3).

The data have been collected from project documents and through interviews with key informants. The data sources reflect viewpoints from different levels and roles within the ES implementation project. The study thus represents an analysis of the experiences and interpretations of key actors in the project.

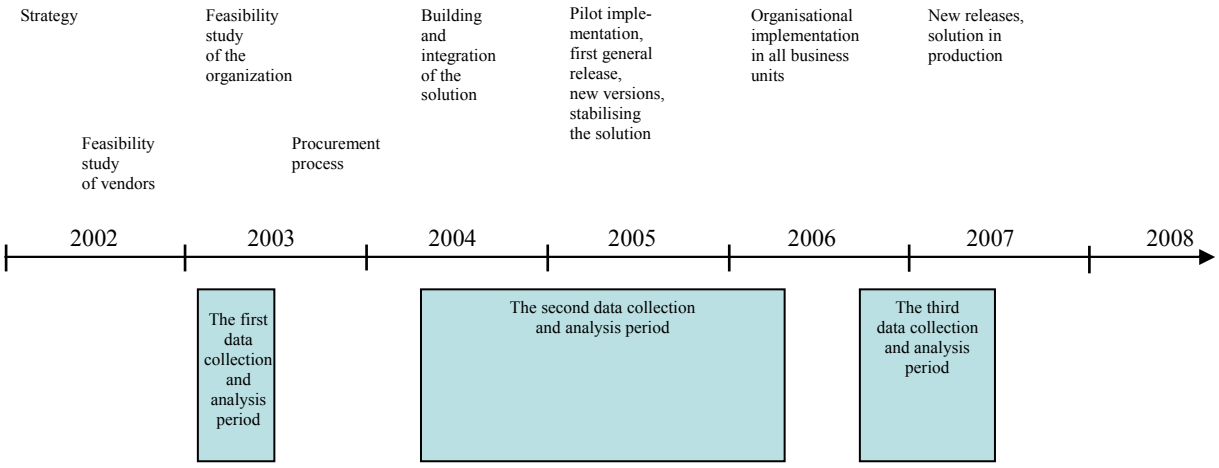

Figure 6. The main project phases of the Statoil case above the timeline, together with my research activities below (c.f. Figure 3)

An overview of the data collection activities in each of the three phases of the Statoil case study is presented in Table 3. To get access to information-rich informants has been a priority, and therefore a partial "snowball" or chain-sampling of informants was used (Patton, 1990). This means that at the end of the interviews advice was asked on whom else one should talk to concerning the questions raised. Within a series of interviews, the sequence of informants has in some instances been opportunistic (Patton, 1990). This means that the information-rich informants selected have been interviewed whenever they were available.

The principal data collection method was in-depth, semi-structured interviews, combined with background information from my previous data collection and analysis efforts. The interviews typically lasted 45 minutes and took place at Statoil's headquarters, mostly in meeting rooms. Four of the interviews were by phone, and some follow-up questions were answered by e-mail. To remain both focussed and open, a general interview guide approach was combined with an informal conversational interview, to "go with the flow" (Patton, 1990). The interview guides (Appendix B) were developed on the basis of three sources: (i) the research questions of chapter 1, (ii) the literature of chapter 2 and (iii) what was learnt from the interviews and project documents as the research progressed. All interviews were audio-taped and transcribed. To increase knowledge as the interviews progressed, an interim analysis (Miles and Huberman, 1994) was performed and the interview guides evolved. All interview questions therefore evolved with an increased knowledge, in harmony with the principle of the hermeneutic circle (Klein and Myers, 1999).

The themes of the interviews in the first data collection and analysis period included demographics, different solution scenarios, the customization concept, expected customization needs and perceived challenges at the time of the feasibility study.

Phase	Activities	Informants	Documentation
The first data collection and analysis period	Initial contact and document collection	The corporate advisor for Collaboration & Information management (C&IM advisor) [1]	E-mails Slides: recommended solution. Research report
	Interviews	C&IM advisor and three other project members [1,2,3,4]	Audio-taped and transcribed
	Validation by comparison with other cases	-	60 vendor-reported cases of ECM implementations
The second data collection and analysis period	Document collection	C&IM advisor [1]	Project documents from strategy to current status
	Attended lectures	C&IM advisor [1]	Slides
	Initial interviews	Four key project members [1,2,5,6]	Audio-taped and transcribed
	Follow-up interviews	Two interviews with C&IM advisor [1]	Audio-taped and transcribed
	Further document collection	Key project member [2]	New project documents and a new research report
	Follow-up interviews	Two key project members [2,6]	Audio-taped and transcribed
	Discussions and correspondence	Key project member and C&IM advisor [1,2]	Audio-taped and transcribed. E-mails
	Interviews with project managers	Two consecutive project managers [7,8]	Audio-taped and transcribed
	Validation of published material	C&IM advisor and key project members [1,2,7]	Written comments on E-mail
The third data collection and analysis period	Initial interviews	Two interviews with QA responsible (first corporate user representative) [9]	Audio-taped and transcribed
	Interviews	Three corporate user representatives, two steering committee members, two reference group members, one previous project manager [7,9,10,11,12,13,14,15]	Audio-taped and transcribed
	Document collection	Corporate user representative [11]	New project documents (v2.3)
	Follow-up questions	Corporate user representatives, previous project manager [7,10,11]	E-mails
Case summary		A total of 23 interviews with 15 persons	Ca 840 pages of documents analysed

Table 3. Overview of data collection activities for the Statoil case study. Informant numbers are shown in square brackets

The interview questions in the second data collection and analysis period were guided by the literature on ES implementation (sections 2.2 and 2.3). The themes of the interviews in the second data collection and analysis period included project phases, special incidents in the

project that had influence on the development of the project, the request for proposals process, possible tensions between standard software and Statoil's needs, the need for adaptation, how custom components were prioritized, any conflicts in the project, possible contradictions in the project, a discussion of whether the 4 motors of change applied to this project (c.f. section 2.2) and if so, how they developed. The interviews often concluded with feedback on my initial interpretations to rectify these.

In addition to an initial interview, the interview questions of the third data collection and analysis period were guided by the literature reviewed in section 2.5. The themes of the interviews in the third data collection and analysis period included the corporate user representative role in general, the role related to the dialectic of adaptation, how contradictions were dealt with, organizational influence processes for the corporate user representative, political skill, influence tactics, as well as the roles of the project group, the reference group and the steering committee. The interviews also included a definition of the three common direct influence processes (Figure 2 in chapter 2), and the informants were asked to assess the corporate user representatives according to these.

For the first two phases of the study, there was a considerable document collection in addition to the interviews. The first data collection and analysis period consisted of project documents from the project strategy and onwards (Table 4), supplemented with four initial interviews. The second data collection and analysis period included project documents produced after the first period, together with important project documents produced during the second period (Table 4). The second data collection and analysis period also included attendance at two presentations of the project and a total of ten interviews. The third data collection and analysis period drew upon the previous data in addition to nine interviews.

The informants in the third data collection and analysis period are listed in Table 5. This illustrates how the data sources reflect viewpoints from different levels and roles within the ES implementation project.

The dialectic focus constituted a challenge in the interview situation. Interview questions were formulated with the utmost care to avoid leading questions. To trace possible contradictions, questions contained themes like: different interests, different opinions or priorities, possible tensions, possible contradictions and possible conflicts. However, sometimes informants would become defensive and deny the existence of any personal conflicts. Then it was necessary to explain in the interview that a contradiction does not necessarily imply a conflict (Bjerknes, 1992).

Phase	Date	Type of data	Remarks
The first data collection and analysis period	03.2002	CM in Statoil, project presentation by key project member	Slides
	06.2002	In-depth study of ECM issues during the strategy process, including 8 interviews of key stakeholders	In Munkvold et al. (2003), report
	08.2002	eCollaboration Strategy, report	Paper
	09.2002	Project handbook, feasibility study	Paper
	12.2002	Feasibility study: Steering group presentation	Slides, on paper
	01.2003	Project handbook, solution scenarios	Paper
	02.2003	Corporate taxonomy and ECM, presentation by C&IM advisor	Slides, on paper
	05.2003	Recommended solution, preliminary version by key project member	Slides, on paper
The second data collection and analysis period	10.2003	Request For Proposal, RFP 2003/00683	Electronic version
	03.2004a	eCollaboration key issues, review of report	Slides, on paper
	03.2004	"Out-of-the-box" implementation of Statoil's new collaboration and information management solution: Issues	Internal Report
	06.2004	Collaboration@Statoil functional and non-functional specification	Electronic
	08.2004	Custom components design specification v1.0	Electronic
	09.2004	Project handbook, phase 5 - Implementation	Paper
	10.2004	Project presentation, Collaboration@Statoil, by C&IM advisor	Slides, electronic
	05.2005	Project handbook version 2	Paper
	09.2005	Project handbook, version 2.1 & 2.2	Paper
	10.2005	Project presentation, Collaboration@Statoil	Slides

Table 4. A specification of the types of documents used in the Statoil case study

Date	Type of data
12.2005	Interviews with the two project managers
10.2006	Initial interview with the QA/first corporate user representative
02.2007	Follow-up interview with the QA/first corporate user representative
03.2007	Interviews with the second and third corporate user representative
04.2007a	Interviews with two reference group members
04.2007b	Interviews with two steering committee members

Table 5. The informants of the third data collection and analysis period

3.3.2. Data analysis

Longitudinal process research was used to broaden the perspective on this ES implementation and to further validate beyond what can be supported by immediate observations. Pettigrew's (1995) stance on how to study organizational change in context was heeded, namely that it requires multilevel analysis (i.e. varying levels of analysis) and processual analysis (i.e. analysis of sequential, temporal and historical dependencies). Multilevel analysis was done at: (i) project level, (ii) group level with groups of users having diverging interests, and (iii) individual level regarding the corporate user representative role. Processual analysis implied a comparison with IT governance statements on using standard software as-is, and an analysis of how issues developed in comparison with the project strategy.

The data analysis started with a deductive analysis based on the interview guides. This deductive analysis included coding according to topics in the interview guides, data reduction and displays. The data analysis continued with an inductive analysis (Patton, 1990) of themes and categories occurring in the data. As interviews progressed, they were transcribed and an

interim analysis (Miles and Huberman, 1994) was performed. Although the Atlas.ti software has been used for the data analysis of the mini cases described in section 3.4, it was not used for the data analysis of the longitudinal study. The reason is that the coding with Atlas.ti had not given me a better sense of overview over the data than a coding done by hand on interview printouts. The hand coding on interview printouts and other documents was supplemented with tables, drawings and mindmaps. Although Atlas.ti to some extent was found useful to link themes to specific pieces of text in my transcripts, there was an experience of what Walsham (2006) calls a tendency to get locked in to the coded themes as the only way to look at the data.

The data analysis was iterative and followed a hermeneutical circle in line with Klein and Myers (1999). Iterations continued until the parts of data were considered consistent with the whole. In particular during the second and third data collection and analysis periods, the interviews were analysed in several iterations. The following data analyses were typically done: (i) a quick overview immediately after each interview to apply new insights in subsequent interviews, (ii) an analysis in parallel with the interview transcription, adding comments in brackets, and (iii) a thorough data analysis after a series of interviews were completed. In general, the thorough interview analysis (iii) contained the following elements:

- Lists of codes were developed, based on the interview guides. The interviews were coded and according to these a deductive analysis was based on the interview guides. Coding was done by hand on printouts of the transcribed interviews.
- Data reduction and displays (Miles and Huberman, 1994) were made. These were mainly tables, summarizing the interviews. A visual mapping strategy (Langley, 1999) was also used, as mindmaps were drawn to help to aggregate the data from the transcribed interviews.
- Data were also aggregated in tables according to informant groups, such as steering committee, reference group and corporate user representatives.
- To complement the deductive data analysis, an inductive data analysis (Patton, 1990) was done. This inductive data analysis focused on phrases used repeatedly by the informants and new themes that occurred in the interview data. From this analysis several new themes and categories emerged. These themes were explored in subsequent interviews and later incorporated into the lists of codes used for deductive analysis.
- The data were compared with the theory reviewed in chapter 2, to get insight on the phenomenon studied.

Some time after preliminary conclusions had been drawn, the interviews were analyzed again in view of the conclusions. This often resulted in additional insights. The data analysis has therefore been a combination of learning from the data itself, with an inductive analysis (Patton, 1990) of themes and categories occurring in the data; and an analysis based on the theory used. Findings were later discussed with informants, as described later.

The document analysis occurred in parallel with interview analysis. After an initial annotation of the documents the document analysis was mainly by means of data reduction and displays as described above. Some tables were created, but more often a visual mapping strategy was used. Sketches were made on paper and later refined as drawings in PowerPoint, to help aggregate and make sense of the data. Sketches and drawings focused in particular on relationships and developments over time, to understand how phenomena developed in the larger context. This was done because it is important to expose processes and mechanisms of change through temporal analysis (Pettigrew et al., 2001). An example of such a data analysis

is how contradictions emerged over time. PowerPoint drawings were later discussed with some key informants, such as the previous project manager and both the previous and then current corporate user representative.

3.3.3. Literature used in data collection and analysis

In addition to this description of the data analysis, in the following some details are given on the literature used in each data collection and analysis period.

The data analysis of the first data collection and analysis period was informed by the literature presented in section 2.1. To complement this rather brief study of Statoil, a secondary analysis of the Association for Information and Image Management's (AIIM) 60 case descriptions of ECM solutions (www.aiim.org/all_cs.asp) was conducted in May 2003. The reason for choosing this data source was AIIM's espoused independence of any particular kind of enterprise content management (ECM) product or vendor. The cases thus represent already implemented solutions for a variety of organizations from a variety of vendors. The secondary analysis of the case descriptions was used to compare with the Statoil findings.

The data analysis of the second data collection and analysis period was based on the literature presented in section 2.2 and 2.3. The research effort continued in 2004 and in 2005 with a focus on studying the dialectic motor of change through interviews, in addition to collecting available project documentation that supported the teleological and life-cycle-based views on development.

Dialectics was used as a sensitizing concept (Patton, 1990) to guide further data collection and analysis. This means that dialectics focused the attention of the research on contradictions in the project. Combined with Pettigrew's (1990) advice on longitudinal research on change, this meant exploring the larger context and paying attention to the "often contradictory ways that change emerges" (p 268). Following Robey and Boudreau (1999), the opposing forces at play were thus identified through process research. Multiple interpretations of the data were sought, applying multiple theoretical patterns in the analysis. The four motors of change (c.f. section 2.2) constitute important patterns used in the data analysis. An analysis based on dialectic forces was an a priori choice (Robey et al, 2002) in the latter part of the study. The initial findings were probed as open questions in subsequent interviews, and at a later stage the motors of change that were identified, were verified with key project members. The final interpretations were also confirmed with two of the key ECM experts in Statoil. The iterative data collection and analysis process allowed for observation and verification over time.

The data analysis of the third data collection and analysis period was based on the literature presented in section 2.5. Several iterations of analysis of the initial interviews (c.f. Table 5) occurred in parallel with a search for an appropriate theoretical lens.

The research was not initially attending to the importance of the theory of organizational influence processes; that came gradually as the interview data lead to a particular focus on the corporate user representative role. Power issues were important for this role and to study these power issues, the organizational influence process literature was found relevant. Interview guides therefore included questions on organizational influence processes. In retrospect, it is evident that the organizational influence processes played a significant role in practice and that these were understood in action by some of the organizational actors. Gradually the

emerging patterns of the organizational processes were seen, and thus it was possible to relate the patterns to theory. The theory of organizational influence processes was found relevant to make sense of the case data. This theory then became part of a sensitizing concept (Patton, 1990) to focus the attention in further data collection and analysis. An alternation between the different theoretical viewpoints presented in section 2.5, thus emerged as a useful approach during the analysis of and reflection upon the case data. This is in line with qualitative data analysis as an iterative process as proposed by Miles and Huberman (1994).

3.4. Mini cases

In addition to the longitudinal case study of Statoil which gives an implementing organization's perspective, another perspective was applied to provide answers to research question two of chapter 1. In an attempt to understand contradictions in ES implementations, the question has also been explored from a vendor perspective through mini cases. The concept of mini cases is used by e.g. Weill and Olson (1989). A study of three mini cases was supplemented with an analysis of six other ES vendors' web pages and documents. These data form the basis for the first publication (in Appendix A). The reason for exploring the vendor perspective is to supplement the implementation research with a study of enterprise systems as an artefact.

The mini cases were selected to get a wider outlook by studying different systems. Heterogeneity was the main criterion for mini case selection, both concerning type of system and size. Two types of enterprise systems were analyzed, ERP and ECM. The reason for selecting ERP systems was its predominance in the literature (c.f. chapter 2), and the reason for selecting ECM was its role in the solution studied in the longitudinal case study (Figure 4).

The three mini cases are Agresso and MultiPlus (ERP), and eZ Systems (ECM). Full details of the mini cases are given in publication 1 of Appendix A. Company data are from 2004, the time of study. The three mini cases are briefly presented in the following.

Agresso is a large ERP vendor based in the Netherlands (www.agresso.com). With more than 2300 customers in 70 countries, Agresso offers ERP solutions both to public and private sectors. Two interviews were carried out with the Agresso product manager at one of their main implementation partners in Norway. Another interview was with a hired consultant who was the project manager for a large Agresso implementation project in the public sector. He had 15 years of experience implementing Agresso for customers.

MultiPlus is a small Norwegian ERP vendor specializing in the shipyard industry and other project oriented industries (www.multiplus.as). As the business idea is to provide standard systems to selected business sectors, their customers are rather homogeneous. Two interviews were carried out, one with a project manager and the other interview was with a senior consultant.

eZ Systems is an Open Source ECM vendor with over 2 million downloads in 2004 (http://ez.no/). Their idea is to provide flexible solutions rather than "off-the-shelf" software. A kernel is developed and controlled exclusively by eZ Systems. Consultancy is an important part of eZ Systems' business model, and ranges from adapting templates for small businesses, to complex integration with legacy systems in large enterprises. Two interviews were carried

out with eZ Systems. One of the informants has a split role between management of customer projects and programming, the other informant is a systems engineer, responsible for all customer projects in the company.

The six vendors who were subject to document analysis were SAP (www.sap.com), and five ECM vendors: FileNet (now owned by IBM), Vignette (www.vignette.com), Documentum (now delivered by EMC), Interwoven (www.interwoven.com) and Stellent (now owned by Oracle). SAP was selected for its market position, the five ECM vendors were selected because they were at the top of the CMS report at the time of study (CMS Watch, 2006).

3.4.1. Data collection

An overview of the data collection activities for the mini cases is presented in Table 6. Following an initial literature review, interviews were made with representatives from MultiPlus and eZ Systems, and an implementation partner for Agresso. A year later these findings were supplemented with a document analysis of six other ES vendors (c.f. Figure 3).

Type of ES	Vendor	Activities	Type of data	Time
ERP	Agresso	Interviews with e-mail follow-up	Audio-taped and transcribed interviews, e-mails	2004
	MultiPlus	Interviews with e-mail follow-up	Audio-taped and transcribed interviews, e-mails	2004
	SAP	Document analysis	Web documents and pdf files	2005
ECM	eZ Systems	Interviews with e-mail follow-up	Audio-taped and transcribed interviews, e-mails	2004
	FileNet	Document analysis	Web documents	2006
	Vignette	Document analysis	Web documents	2006
	Documentum	Document analysis	Web documents	2006
	Interwoven	Document analysis	Web documents and pdf files	2006
	Stellent	Document analysis	Web documents and pdf files	2006

Table 6. Data collection for the mini cases

The six informants were selected as information-rich informants, as they had between 5 and 15 years of implementation experience. The interviews were carried out as qualitative, open interviews based on an interview guide (Appendix B). The interviews lasted approximately 40 minutes each, and they were audio-taped and transcribed. Interview topics included demographics, commonality, variability, the C/V balance, adaptation of system and adaptation of organization. These topics also guided the collection of documents for analysis. The following keywords were among the search criteria for documents: configuration, unique customer, and best practices.

3.4.2. Data analysis

The data analysis was guided by the principle of the hermeneutic circle (Klein and Myers, 1999), with iterations between theory and data. Through the research questions, dialectics was used to guide data collection and analysis, together with the concepts of commonality and variability (reviewed in section 2.1).

Using the Atlas.ti software for data analysis, the interviews were coded according to the following categories: commonality, variability, adaptation of system and adaptation of organization. The findings from the interviews were followed up with a document analysis of vendor statements published on the web. Statements in web pages and documents were aggregated and classified according to the same categories as the interviews. Textual analysis was used to identify contradictions, searching for contradictory messages as suggested by Lewis (2000). In addition to deductive coding schemes, an inductive data analysis was also done.

3.5. Validity issues

This section describes the validity issues of the research approach. The extent to which the findings may be generalized will be discussed in chapter 6.

The most important validity issues concern the longitudinal case study of Statoil. The Statoil case study is based on interviews and project documents as the main data sources, supplied with some e-mails and discussions. Triangulation or combination of methods is a way to strengthen the study (Patton, 1990). Data triangulation was used as the interviews had a diversity of informants who presented different perspectives on the phenomena, and the interviews were compared with project documents. Following the project for five years, 23 interviews with 15 informants may be viewed as a limited set of data. However, the snowball sampling (Patton, 1990) of information-rich informants with different perspectives (Table 5), gave insights and access to a variety data. Informants were also used to validate findings from previous interviews. In addition, documents were an important source of information. Some of the 840 pages of documents provided vital and compact information. Among these documents were the strategy, feasibility study, the recommended solution, request for proposals, the internal report on critical issues and the custom components specification (c.f. Table 4).

The first data collection and analysis period was based on documents and four interviews, supplemented with a comparison with 60 vendor-reported cases. The publication based on the first data collection and analysis period was sent to two key informants for comments prior to publication. Later the findings from the first data collection and analysis period were scrutinized during the second data collection and analysis period, and important findings were confirmed.

The second data collection and analysis period was validated in the following ways. At the end of the second data collection and analysis period, the findings were discussed at the end of the interviews with the former and current project manager. These discussions were audio-taped and transcribed. In addition there was a validation of material prepared for publication. This was done by the collaboration and information management advisor and a key project member. Detailed written comments on the documents were received by e-mail. Later the findings were discussed with informants as part of the third data collection and analysis period, and no discrepancies surfaced. On the contrary, they filled in some more details, from their perspectives.

There is one possible limitation in the interview data from the second data collection and analysis period. These data reflect mainly the project group viewpoints. Although one key

informant participated in the steering committee and the reference group, most of the informants in the second data collection and analysis period came from the project group. However, important findings from the second data collection and analysis period were later verified with most of the informants of the third data collection and analysis period.

The third data collection and analysis period was mainly validated through data analysis. This was done by a careful comparison of the viewpoints held by the different groups of informants: the steering committee, the reference group, one project manager and the three corporate user representatives. Only data that were consistent across these different groups of informants were included. Information given in one interview was also tried out in subsequent interviews. The publications from the third data collection and analysis period were sent to all the informants involved and resulted in three responses. The responses were from key informants and they largely confirmed the findings presented in the publications.

The interview data of the third data collection and analysis period may be biased in the sense that they to some extent reflect the project's viewpoints. The management perspective is only represented by two steering committee members, and the user perspective is only represented by two reference group members. This means that the answers this thesis gives to the research questions of chapter 1 are possibly limited to a project perspective.

Finally a brief discussion of validity issues for the mini cases is needed. The limited number of six informants raises concerns of validity, and this was the reason for supplementing the data with a document analysis of other vendors' statements. In line with the principle of the hermeneutic circle (Klein and Myers, 1999), the interviews modified previous assumptions and provided a clearer focus for the later document analysis. Data triangulation strengthened the study of the mini cases. Interviews with informants from different vendors and implementation partners were compared with documents and statements on the web pages of other vendors. The document analysis validated the findings from the interviews, and demonstrated that the findings of the three mini cases were valid for the other six ES vendors. Since these vendors were different from the vendors of the Statoil case, they provided a wider basis for understanding contradictions.

To summarize the validity issues, this research has since its inception viewed as an ideal the principles for interpretive field research in information systems, set forth by Klein and Myers (1999). The extent to which these principles have been adhered to are summarized in Table 7. As Table 7 shows, none of Klein and Myers's (1999) principles were totally left out, but principles 1, 2, 4 and 6 have especially been applied.

Principle	Applied in this research
1. The fundamental principle of the hermeneutic circle	Both data collection and data analysis followed this principle. There were a number of iterations between the whole as presented in theory, the parts of documents and informant statements, and the whole ES implementation process studied.
2. The principle of contextualization	The historical background for the research setting was reflected on, in particular the Lotus Notes/Domino solutions that evolved in the 1990s.
3. The principle of interaction between the researchers and the subjects	The social construction of these data occurred as the researcher was an outside observer interacting with the informants. This is a limitation compared to the richness of data that could have been available to a project participant.
4. The principle of abstraction and generalization	The details from the data interpretations were related to the theoretical concepts introduced in chapter 2, such as the dialectic motor of change, the social actor concept and organizational influence processes.
5. The principle of dialogical reasoning	Dialectics in itself implies dialogical reasoning. What this thesis does not address, are possible contradictions between the theoretical preconceptions guiding the research design and actual findings. In other words, the learning process has not been spelled out in the thesis.
6. The principle of multiple interpretations	The viewpoints and interpretations among of the different groups of actors (Figure 5) have been taken into account, e.g. reference group compared to the corporate user representative. Multiple theoretical interpretations have also been sought, comparing with the four motors of change presented in section 2.2.
7. The principle of suspicion	Suspicion has been applied only to a limited extent, i.e. in interviews with the individuals who have filled the corporate user representative role. For the majority of the interviews, statements have been accepted at their face value and compared with other data.

Table 7. A summary of validity issues compared to Klein and Myers' (1999) seven principles for interpretive field research in IS

4. Research publications

To address the research questions raised in chapter 1, the research described in chapter 3 has resulted in five publications. Table 8 contains a list of the publications, and the full text of each publication is in Appendix A. Note that publication 1 is not first in order of publication, but is presented first since the focus is on ES vendor issues, and these occur prior to any implementation. Publications 2-5 appear in chronological order, they focus on ES implementation issues, and are all from the same longitudinal case of Statoil (chapter 3).

The mini cases described in chapter 3 resulted in publication 1. The first data collection and analysis period resulted in publication 2, the second data collection and analysis period resulted in publication 3, and the third data collection and analysis period resulted in publications 4 and 5. The publications are related to the research questions as shown in Table 9.

No.	Title	Published
1	Nordheim, S. (2007). Towards a dialectic understanding of Enterprise Systems – Vendor challenges and contradictory rhetoric	In Magyar, G. et al. (eds): Advances of Information Systems Development: New Methods and Practice for the Networked Society, vol 1. Springer, pp 11-22.
2	Nordheim, S. and Päivärinta, T. (2004). Customization of Enterprise Content Management Systems: An Exploratory Case Study	Proceedings of the 37th Hawaii International Conference of System Sciences, Big Island, Hawaii. IEEE. (CD-ROM).
3	Nordheim, S. and Päivärinta, T. (2006). Implementing Enterprise Content Management: From Evolution through Strategy to Contradictions Out-of-the-Box	European Journal of Information Systems, 15, pp 648–662.
4	Nordheim, S. (2008). Corporate User Representatives and the Dialectics of Enterprise Systems: A Quest for Social Actors with Political Skill	Proceedings of the 41st Hawaii International Conference on System Sciences, Big Island, Hawaii. IEEE. (CD-ROM).
5	Nordheim, S. and Nielsen, P.A. (2008). Enterprise System Implementations: Organizational Influence Processes for Corporate User Representatives	Proceedings of the 16th European Conference on Information Systems, Galway, Ireland. (CD-ROM).

Table 8. Research publications

Research questions	Publications
Q1. What are the main contradictions when implementing enterprise systems?	3
Q2. How can we understand contradictions in enterprise system implementations?	1, 2 and 3
Q3. How can we constructively deal with contradictions in enterprise system implementations?	4 and 5

Table 9. The relationships between research questions and publications

The five publications are related to different phases of the ES implementation process, as illustrated by figures 3 and 6 in chapter 3. The sequence of the five publications also illustrates an evolving focus in the research. It started out with a software focus on ES dialectics (publications 1 and 2), continued with an organizational change perspective (publication 3) and ended up with a stakeholder focus on ES dialectics (publications 4 and 5).

For each publication presented in the following, there is an introduction that includes the research focus and a subsequent description of the findings.

4.1. Understanding contradictions by pre-implementation considerations of ES vendor challenges

Nordheim, S. (2007). Towards a dialectic understanding of Enterprise Systems – Vendor challenges and contradictory rhetoric

In a PhD thesis on ES implementation, some discussion of ES technology is in order. Publication 1 is the only publication with a sole focus on technology. It applies a theoretical perspective on ES technology, and considers the larger context of ES implementation, in line with longitudinal research (Pettigrew, 1995).

4.1.1. Presentation

In order to understand possible contradictions that may surface in the ES implementation process, an understanding of a fundamental challenge within ES technology itself is relevant. A basic challenge that ES vendors face, is presented in publication 1, i.e. how to satisfy unique organizational needs with generic software. By applying the software engineering perspective of commonality and variability (C/V) (chapter 2 section 1), this publication presents a dialectic view of C/V and raises the question:

In a dialectic perspective, what are the ES vendor challenges related to the commonality/variability design issue, and what are the possible implications for ES customers?

4.1.2. Findings

One major ES vendor challenge was found, and this was termed a dialectic of design. This challenge is to find an optimal balance between stability and change, between commonality and variability. It is argued in publication 1 that this challenging design trade-off is a manifestation of contradictions inherent in the development of ES. One way to understand important contradictions that surface when implementing ES, is therefore by appreciating the vendors' dialectic of design.

For an ES customer, there are two important implications of the challenging dialectic of ES design. First, if ES variability is unable to meet the customer's requirements, a considerable pressure is applied to make the customer adapt to the system. This occurs prior to the ES implementation, and is also expressed through the second implication of the dialectic of

design, termed the ES vendors' dialectic rhetoric. ES vendors simultaneously promoted both commonality and variability in a dialectic rhetoric vis-à-vis a potential customer.

It may therefore be helpful for an organization implementing an ES to be able to consider the rhetoric as contradictory during the chartering phase. Viewing the underlying C/V design as a dialectic "either-or", may enable ES customers to see through the vendors' "both-and" rhetoric during the chartering phase.

4.2. Exploring early manifestations of contradictions in the chartering phase

Nordheim, S. and Päivärinta, T. (2004). Customization of Enterprise Content Management Systems: An exploratory case study

Publication 2 represents an initial attempt, early in the chartering phase, to understand possible important contradictions that later may surface in the ES implementation process.

4.2.1. Presentation

This publication attempts to understand contradictions, by a narrow focus on customization needs for the ECM part of Statoil's ES solution. Customization is certainly not recommended (e.g. Beatty and Williams, 2006; Nah and Delgado, 2006), but it is a possible synthesis in an attempt to satisfy unique needs with generic software. Perceived needs for customization was used as a way to explore and anticipate possible contradictions early in the chartering phase. In publication 2 the concept of customization related to ECM systems is explored, and a definition of the concept is suggested together with a presentation of what customization means in this context. The data in publication 2 are supplied with secondary data from other cases published on the web.

4.2.2. Findings

Publication 2 contributes to ground the concept of customization in ECM systems and its role in the requirements definition phase of such development initiatives. The study concludes that the perceived needs for customization are mainly seen in the following areas: non-functional integration with existing software, simplification of user interfaces, and functional adaptation and simplification of the ECM package.

An important implication is the need to scrutinize carefully these customization needs, before selecting a complex ECM product. The reason is that these customization needs later may surface as contradictions in the ES implementation.

4.3. Analyzing contradictions through the project phase

Nordheim, S. and Päivärinta, T. (2006). Implementing enterprise content management: From evolution through strategy to contradictions out-of-the-box

Publication 3 presents a longitudinal study of the ES implementation project, in an organizational change perspective. This is a follow-up from publication 2, and presents a study of important contradictions that evolved and surfaced in the project. The aim is to understand important contradictions occurring in the ES implementation process.

4.3.1. Presentation

This publication applies a wide focus on the ES implementation process. In order to understand the development, four possible drivers of organizational change are taken into account (chapter 2 section 2). Although the study is framed in terms of the ECM part of the solution, it analyzes the chartering and project phases for the entire ES. The research question was:

What issues emerge during the process of developing strategic, enterprise-wide content management systems?

4.3.2. Findings

This publication presents a hybrid ES implementation process. It shows that a combination of three organizational motors of change was involved: the teleological, life-cycle, and dialectical.

Two contradictions surfaced in the ES implementation process, the first was labeled the dialectic of adaptation, and the second was the dialectic of learning. Although it did not surface as an important contradiction in this case, the dialectic of learning between knowledge of existing solutions and knowledge of new solutions confirmed previous ERP research (chapter 2 section 3).

The dialectic of adaptation, however, surfaced as an important contradiction between an as-is implementation of standard software, and an implementation fulfilling the organizational requirements of solution integration and user experience. This dialectic of adaptation may be summed up in the following way: “we ought to implement commercial software as it is, out-of-the-box” (thesis) vs. “no, we ought to implement the software so that we fulfill our requirements concerning solution integration and a simplified user experience” (antithesis).

Several dimensions contribute to understand this contradiction:

1. The dialectic of adaptation occurred in combination with the teleological and life cycle motors of change.
2. The dialectic of adaptation emerged. It could be traced back to the project strategy, but was only latent in the beginning. The dialectic of adaptation emerged in the project phase, with a climax after an “out-of-the-box” installation of the ES, as it manifested

as 42 critical issues. The language used reflected that the contradiction emerged from "concerns", "weaknesses" and "uncertainties" to "critical issues".

3. The dialectic of adaptation may be understood as a consequence of the generic ES software being unable to satisfy Statoil's unique needs, as illustrated in Figure 5 in publication 3 (p 659).
4. The dialectic of adaptation may further be understood as consisting of diverging viewpoints on functionality among the different stakeholder groups involved. This occurred as the representatives from different solution domains advocated their needs in the heterogeneous project steering group. Those who worked with different parts of the solution wanted to get "their" components prioritized first.

Publication 3 addressed how these contradictions in the dialectic of adaptation were dealt with, from a product perspective. The requirements focused on two main concerns: solution integration and a simplified user experience. The dialectic of adaptation was solved in a number of ways and over several releases, as the synthesis varied from issue to issue.

The data collected for publication 3 also gave important leads as to how the dialectic of adaptation was dealt with in a stakeholder perspective, and this is the topic of publications 4 and 5.

4.4. Dealing with contradictions: The corporate user representative role

The most important stakeholders in the dialectic of adaptation were the different business units and their users (publication 4). This led to the sponsor's establishment of a corporate user representative role. This role became an important social actor in the ES implementation, and came to play a key role in dealing with contradictions. Publications 4 and 5 therefore address important characteristics of this role, in order to understand what the essential characteristics were in order to deal with contradictions in this ES implementation process.

4.5. Essential characteristics to deal with contradictions: Social actors with political skill

Nordheim, S. (2008). Corporate user representatives and the dialectics of enterprise systems: A quest for social actors with political skill

Publication 4 contributes to the research question of what is needed to constructively deal with contradictions (Q3), by describing the corporate user representative role.

4.5.1. Presentation

In order to understand the corporate user representative role and what is important to fill the role, the following research question was raised:

Faced with the dialectic of adaptation in Enterprise System implementations, who would fit the role as corporate user representatives?

This publication presents essential characteristics by applying the perspective of the user as a social actor, as described in chapter 2.

4.5.2. Findings

Important contradictions were to a large extent dealt with by the corporate user representative role. In the social actor perspective (chapter 2 section 5), the two social actor dimensions of interactions and identities were found to address the most important characteristics of this role.

The interaction dimension of the corporate user representative role included the following: the role was a single point of contact that communicated requirements to the project, and communicated results back to the business units. This implies being a good listener and communicator and be able to negotiate unifying decisions. One important finding is that the interaction dimension of this role also included political skill (section 2.5). This finding is therefore a contribution to the interaction dimension of the social actor concept.

The identity dimension of the corporate user representative role implied that it had to be considered a management role. A management level change agent with technical and domain competencies was needed. The role required an understanding of the totality of the solution, i.e. knowledge of application domains, and technical competence to comprehend long term consequences of the requirements. A good corporate user representative in an ES implementation project is vital, but may be hard to find.

4.6. Essential characteristics in view of organizational influence processes

Nordheim, S. and Nielsen, P.A. (2008). Enterprise system implementations: Organizational influence processes for corporate user representatives

Publication 5 is a further exploration of the corporate user representative's identity dimension, and thus addresses an important aspect of what is needed to deal with contradictions in the ES implementation process (Q3).

4.6.1. Presentation

Publication 5 elaborates on the management level aspect of the social actor's identity dimension (c.f. chapter 2, section 6). Prior research has suggested that the process of negotiation in the dialectic of adaptation is usually "messy" because it lacks a consistent basis for decision-making, and because it depends on the balance of power and knowledge among the parties, as well as the amount of available resources (Soh and Sia, 2005). The theory of organizational influence processes (chapter 2 section 5) describes important differences as regards the application of power, and it simplifies the complex concept of power. This theory is therefore used to analyze differences between the individuals who filled the role as corporate user representative during the project.

The following research question was raised:

Faced with the challenges of an ES implementation, how may we understand the corporate user representative role through the perspective of organizational influence processes?

4.6.2. Findings

To be able to deal with important contradictions, the identity dimension of the corporate user representative should take into account organizational influence processes. These account for important differences between the corporate user representatives in this ES implementation process.

At the outset one corporate user representative had to perform upward influence processes from a lower formal position, and this impeded the role. A later corporate user representative in a high formal position and with lateral and downward influence processes to the steering committee and the project group was more influential. This representative avoided the problematic upward influence.

Due to the complexity and scope of an ES, the corporate user representative role required an individual coming from a high enough formal position to avoid upward influence processes. To avoid the challenging upward influence and rather attempt lateral influence is line with Porter et al., (2003). This is therefore a contribution to the identity dimension (Lamb and Kling, 2003) of the role, to ensure a high enough formal position to avoid the problematic upward influence processes. Organizational influence processes are essential in order to be able to deal with important contradictions. In addition, the corporate user representative benefits from a strong reference group to give input from the organization.

5. Contributions

To summarize the thesis so far, chapter 1 introduced the research questions, and chapter 2 reviewed literature pertaining to these questions. The research approach was described in chapter 3, with the resulting publications summarized in chapter 4. Based on the publications presented in chapter 4, this chapter discusses the contributions and implications of this research. An overview of the research questions and results are shown in Table 10, which provides an outline of this chapter.

Research question	**Contributions**
Q1. What are the main contradictions when implementing enterprise systems?	The main contradiction found was termed the dialectic of adaptation. It was a contradiction between an ”out-of-the-box” implementation of commercial software and an implementation fulfilling the organization’s requirements of solution integration and user experience.
Q2. How can we understand contradictions in enterprise system implementations?	The vendors’ challenging dialectic of design is one way to understand why the dialectic of adaptation occurred in the implementation process.
	The dialectic of adaptation could be understood early in the chartering phase by focusing on perceived customization needs.
	The dialectic of adaptation could in the project phase be understood: 1. As emerging in the ES implementation process, it could be traced back to the project strategy 2. As a dialectic motor of change in combination with the teleological and life cycle motors of change 3. As the result of diverging viewpoints on functionality, advocated by user groups from different domains.
Q3. How can we constructively deal with contradictions in enterprise system implementations?	The establishment of a corporate user representative role was one important way to deal with the dialectic of adaptation in this case. Essential characteristics for this role included two social actor dimensions: 1. The role’s interaction dimension presupposed a good listener and communicator with political skill 2. The identity dimension implied that organizational influence processes should be considered carefully, in order to achieve lateral influence processes.

Table 10. Overview of the research questions and contributions of this thesis

5.1. Research question 1

Q1. What are the main contradictions when implementing enterprise systems?

The answer provided to this research question is presented in publication 3. The dialectic of adaptation is a term coined for what surfaced as the most important contradiction when the ES was implemented. The dialectic of adaptation emerged between the features of the ES packages versus the organization-specific requirements addressed by the organization. The contradiction is illustrated in Figure 7, which could be read as follows in a dialectic way: "we ought to implement commercial software as it is, out-of-the-box" vs. "no, we ought to implement the software so that we fulfill our requirements concerning solution integration and a simplified user experience". Two groups of organizational requirements were in focus in this contradiction: requirements regarding solution integration and requirements regarding a simplified user experience.

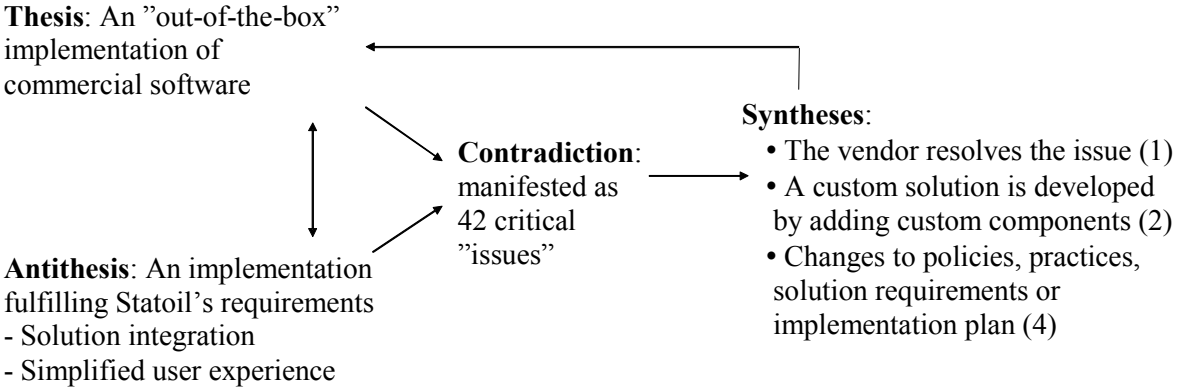

Figure 7. The dialectic of adaptation in Statoil (Figure 5 in publication 3, p 659)

An early pilot experimentation with an "out-of-the-box" installation resulted in a number of concerns, conceptualized and documented as 191 "issues" identified for resolution during the implementation. The issues represented "weaknesses, challenges and uncertainties" in the solution, compared to the organization's strategic goals. The issues were grouped into six different types of issues, such as integration and usability. Table 11 gives an overview of a subset of 42 issues that were categorized as highly critical, i.e. they had to be resolved before a solution could be deployed. That is why the dialectic of adaptation which manifested in the 42 critical issues was an important contradiction. The term dialectic of adaptation is an abstraction of the critical issues raised, and Figure 7 is a summary of these.

The dialectic of adaptation emerged as an important contradiction. It finally manifested in issues that were so critical that they had to be resolved before the solution could be deployed. Different user groups had interests in these issues, and a special role was established to deal with these. This role is presented later as an answer to the third research question.

Issue type	Description	No. of highly critical issues
Architecture	Issues related to the "out-of-the-box" system architecture and infrastructure of the products and the integrated solution	18
Integration	Issues related to the integration of the products with other products/functional components in the "out-of-the-box" solution	
Coexistence with as-is solution	Issues related to the new products' coexistence with existing solutions for collaboration and information management	8
Functionality	Issues related to the "out-of-the-box" functionality of the products	13
Usability	Issues related to the user experience of the products, i.e. interaction mechanisms, simplicity, flexibility, attractiveness and consistency	
Data migration	Issues related to the conversion and migration of information from the existing solution to the new solution	3

Table 11. An overview of the 42 highly critical issues raised by the "out-of-the-box" pilot installation (Table 5 in publication 3, p 657)

Existing literature

In chapter 2 (section 3) three answers to research question 1 were found in the literature: a dialectic of learning, conflicts between designers and stakeholders, and package-organization misalignments.

Contributions

The dialectic of adaptation presented above contributes to the existing literature in the following way. Although the dialectic of adaptation is not used as a term in the literature, it resembles the misalignments in the research of Soh and Sia (2003) (section 2.3). The contribution in this case is an explicit description of the dialectic of adaptation, in another context than ERP. The dialectic of adaptation in this case differs from what has been found to be the case with ERP packages, which typically provide an organization with readily implemented and rigidly adjustable business processes. This solution thus involves less organizational adaptation of business processes than ERP (c.f. publication 3). In this case the organizational implementation focused more on integrated storage and retrieval of information in general. The organization thus can be more flexibly and continually (re)configured on top of the combined ECM and collaboration platform, with software integration and simplification for enhanced user experience instead of adapting processes to software. As the dialectic of adaptation resembles previous ERP findings, it is reasonable to assume that the dialectic of adaptation applies to enterprise systems beyond this case. Although the specific issues involved may be unique to this case, the dialectic of adaptation describes a contradiction applicable beyond this case. That is a contradiction between an as-is implementation of commercial software and an implementation that meets the requirements of the implementing organization.

5.2. Research question 2

Q2. How can we understand contradictions in enterprise system implementations?

The second research question probes deeper into the dialectic of adaptation, and to understand this dialectic it was viewed in different phases. Table 12 provides an overview of different phases and the corresponding understandings of the dialectic of adaptation, understandings provided in publications 1-3.

Phase	Understanding	Description	Source
Pre-implementation	The vendors' dialectic of design, often expressed in a dialectic rhetoric	The dialectic of adaptation may be understood in view of the vendors' challenging dialectic of design, to find an optimal balance between commonality and variability	Publication 1
Early chartering phase	Perceived customization needs for the ES	The dialectic of adaptation may at an early chartering phase be understood by focusing on major customization needs. These included non-functional integration and simplification of user interfaces	Publication 2
Project phase	The dialectic of adaptation as an emergent process	The dialectic of adaptation emerged from being latent in the project strategy to surface as critical issues in the project phase	Publication 3
Project phase	The dialectic of adaptation is part of a hybrid theoretical pattern	The dialectic of adaptation emerged in combination with the teleological and life cycle motors of change	Publication 3
Project phase	The dialectic of adaptation results from diverging stakeholder viewpoints	The dialectic of adaptation occurred as representatives from different solution domains advocate their needs. Different user groups want to get "their" components prioritized first	Publication 3

Table 12. An overview of the contributions to understand the dialectic of adaptation

5.2.1. A pre-implementation perspective on the dialectic of adaptation

An understanding of the dialectic of adaptation would be incomplete without a reflection on the ES technology. A technology perspective is therefore presented in publication 1.

As presented in section 2.1 enterprise systems build on the distinction between commonality and variability (C/V). ES vendors view the C/V balance as a design challenge. The C/V design challenge is to find an optimal balance between stability and change. This C/V design challenge is termed a dialectic of design in publication 1, and the C/V demarcation line is dynamic. The dynamic C/V balance may be appreciated as a positive and important driving force for the development of ES. As ES vendors have chosen to balance C/V in different ways, the synthesis will presumably have to be dynamic, with no final solution.

This dialectic of design provides a background for understanding the dialectic of adaptation. Publication 1 presents how there was a simultaneous promotion of both commonality and variability in the ES vendor marketing. In publication 1 this has been termed a dialectic rhetoric. This dialectic rhetoric was seen in practice, e.g. with a dual emphasis on complete solutions and yet providing powerful customization tools. Another expression of dialectic rhetoric in practice was to promote best practices and at the same time promote the services of numerous consultants. ES consultancy has become a lucrative business that thrives on the challenge to satisfy unique needs with generic software.

Existing literature

According to the literature reviewed in chapter 2 (section 1) the C/V concept has been explored in terms of enterprise systems. However, the C/V concept has not been viewed as a dialectic concept in the reviewed literature.

Contributions

The concept termed dialectic of design is a new contribution. It contributes to the existing literature by providing a new and dialectic perspective on the C/V concept. This perspective on C/V is one way to understand why the dialectic of adaptation occurs in an ES implementation process. The dialectic of design is also a way to understand previous research that reports on misfits between structures in the ES and the implementing organization (chapter 2, section 3). This is not to be understood in a mechanistic causal sense. Publication 1 is to be understood in a hermeneutic sense, as it presents one of several possible views of enterprise systems. As the dialectic of design applies to a number of ERP and ECM vendors, it is reasonable to assume that these findings apply to a larger set of enterprise systems.

Some of these findings were later discussed with informants in Statoil, and the concept of a dialectic rhetoric was recognized as applicable to Statoil's interaction with one of the vendors. However, there is no indication in the Statoil data whether a dialectic rhetoric influenced their decisions. Since this perspective is outside the scope of this research, it is not elaborated further.

5.2.2. Early chartering phase: perceived customization needs for ES

Early in the chartering phase, one may begin to understand important contradictions by focusing on perceived customization needs. This is the main contribution of publication 2.

At this stage the informants in Statoil could only anticipate how customization would be performed. However, the case highlighted that the customization needs may significantly exceed the standard offers from the vendor and implementation partners. The perceived needs for customization were mainly seen in the following areas: non-functional integration with existing software, simplification of user interfaces, and functional adaptation and simplification. These perceived customization needs for the ECM part of the solution, later turned out to be central issues in the dialectic of adaptation (Figure 7) and were confirmed by later findings (publication 3).

Existing literature

Previous research has established emerging dialectics in the shakedown phase (chapter 2, section 3). According to the literature review in chapter 2, a study of perceived customization needs early in the chartering phase has not been discussed in the literature.

Contributions

To focus on perceived customization needs early in the chartering phase is in itself a new contribution. As an early attempt to understand the dialectic of adaptation, this chartering phase perspective fits with the emergent process view of the dialectic of adaptation, presented below. With the benefit of hindsight, it can be seen that this focus on expected customization needs was useful. This study uncovered some of the contradictions that later became important in the ES implementation (see publication 3). Although a different vendor was finally chosen, and not the two scrutinized in the feasibility study reported here, two of the main issues later emerged in the antithesis of the dialectic of adaptation (Figure 7). As this finding was valid despite the change of vendor in this case, it could indicate that this contribution might be of a more general nature. However, the lack of previous literature calls for further research to explore whether this is the case.

5.2.3. Project phase: the dialectic of adaptation as an emergent process

An important understanding of the dialectic of adaptation is its emergence (publication 3). The dialectic of adaptation can be traced back to Statoil's strategy with its simultaneous ideals of "out-of-the-box" implementation vs. user experience. However, this dialectic was only latent in the beginning. Although manifestations of potential contradictions were explored early by focusing on expected customization needs in the chartering phase (publication 2), the dialectic of adaptation fully emerged in the project phase. The latent contradiction emerged in the project phase as the project stakeholders tried to operationalize both ideals simultaneously. After the "out-of-the-box" pilot installation of the software, it was realized through hands-on experience with the software that the issues of user experience and technological solution integration would challenge the prevailing "out-of-the-box" thesis. The issues of user experience and technological solution integration challenged the so far dominant rhetoric of "out-of-the-box" implementation. The dialectic of adaptation became truly visible in the 42 critical issues raised (c.f. Table 11).

The emergence is also illustrated by the language used. Initially the software packages studied in the chartering phase raised a number of "concerns". These were presented to the steering group as "concerns", "weaknesses" and "uncertainties" to describe how commercially available software could meet the organization's needs. As these contradictions came to a climax, they were labeled "critical issues". The contradictions manifested fully as the 42 critical issues were raised, with a requirement that they be solved before the solution was deployed.

Existing literature

According to chapter 2 (section 3) the literature has not described emergent dialectics before the shakedown phase of ERP implementations (c.f. Table 2 in chapter 2).

Contributions

The emergent dialectic of adaptation presented above contributes to the existing literature in the following ways. The finding that the dialectic of adaptation can be traced back to the project strategy is new. Furthermore, this emergence occurred in the project phase, and is therefore earlier than the emergent dialectics of ERP implementations reported in the shakedown phase (chapter 2, section 3). Previous research further addresses mainly the contradictions between different stakeholder goals, not contradictions inherent in project goals already from the beginning (chapter 2). Since the dialectic of adaptation is an emergent process, a conscious strategy of looking for contradictions and pursuing constructive synthesis could help manage large scale ES projects. By identifying and dealing with contradictions in the early phases, better solutions may be rolled out in the shakedown phase (c.f. publication 3).

Previous ERP literature shows that the emergence of dialectics applies beyond this case. The different timing of dialectics in this case may indicate that other types of enterprise systems are different from the timing of ERP dialectics. Whether dialectics emerge already in the project phase with other types of enterprise systems remains to be explored by further research.

5.2.4. The emergent dialectic of adaptation as part of a hybrid theoretical pattern

A wide perspective on organizational change (chapter 2, section 2) is necessary to understand the ES implementation process, since a hybrid theoretical pattern of change is best suited to describe the ES implementation in this case. This hybrid theoretical pattern of change includes elements from the teleological, life-cycle, and dialectic motors of change (publication 3).

The implementation methodology represented a life-cycle oriented approach to change. There was a combination of teleological rationality organized under the life-cycle-based project model. The teleological and life-cycle motors of change therefore seemed to rationalize the actions of the project stakeholders. The ES implementation project started out with a deterministic strategy and goals, which were operationalized in the project phase in relation to the technological constraints and organizational requirements. Due to the relatively immature technology, the first phases of the Statoil case actually consisted of a few iterations of teleological learning and goal clarification at the strategic level, during which the organization tried to learn and clarify its needs as well as the possibilities inherent in the latest ES software provided by commercial vendors. Then in the project phase, the dialectic of adaptation became truly visible (publication 3).

Indirectly, awareness of the evolutionary motor affected the project, too. That is, the shortcomings identified in the partially uncoordinated evolution of the previous infrastructure provided the reason for explicit introduction of the teleological strategy and life-cycle-based large-scale organization for the project.

Existing literature

In the wide perspective on organizational change presented in chapter 2 (section 2), a combination of different motors of change is acknowledged. As presented in section 2.3, a hybrid model of ERP implementation is also known in the literature.

Contributions

The hybrid theoretical pattern presented above contributes to the existing literature in the following way. The findings of publication 3 differ from ERP observations (chapter 2, section 3) where dialectics come into the picture between the users and the implementers of the system mainly after the project phase. The greatest difference between this case and the hybrid model of ERP development of Besson and Rowe (2001) is the ambiguity of the first phases of ES development in Statoil, as opposed to the suggested clarity of the chartering phase of ERP systems development. This may be due to the fact that the ECM and collaboration technologies combined, had not matured to the extent that ERP technology has.

To interpret the Statoil case, a combination of three motors of development and change (section 2.2) – the teleological, life-cycle, and dialectical – provided a useful perspective. In publication 3 it is therefore argued for the value of discussing all four motors of change and development when theorizing about approaches to ES implementation. In line with Van de Ven and Poole (1995), the complexities of a development process may be analyzed as the interplay between the four ideal-type motors of change, and this research contributes by pointing out a combination of three as relevant in this case. Taking into account teleological, life cycle and dialectic process theories gives a comprehensive perspective on ES implementation. Dialectics was therefore only part of a larger picture, although an important part. As these findings concern generic motors of organizational change, they should be relevant beyond this case.

Dialectics is useful in combination with a teleological perspective, as seen in the latent contradictions in the project strategy. That the dialectic of adaptation can be traced back to the strategy, may also be understood on the basis that corporate strategy often is contested terrain (Lee and Myers, 2004). With this in mind, latent contradictions in project strategies should be expected in other ES implementations as well.

5.2.5. The dialectic of adaptation as the result of diverging stakeholder viewpoints

A stakeholder perspective is also important to understand the dialectic of adaptation (publication 3). Diverging viewpoints on functionality surfaced within the heterogeneous project steering group. This occurred as the representatives from different solution domains advocated their needs. Those who worked with different parts of the solution wanted to get "their" components prioritized first. The emerging contradictions led to sharpened prioritizations of implementation issues and organizational learning among the stakeholders.

As the dialectic of adaptation manifested through different user groups who promoted their interests, a role of corporate user representative was established. The corporate user representative worked for the project sponsor, and was responsible for representing the professional interests of the business units and their users. At the outset the person responsible

for quality assurance had the role, but at the end of the chartering phase the need for a specialized role crystallized. Prior to the statement about the 42 critical issues, the dialectic of adaptation had therefore manifested as tensions and discussions between the corporate user representative and different project groups (publication 4). These are summarized as snapshots of the dialectic of adaptation in Table 13, viewed from the corporate user representative perspective. These were phrased as tensions by the informant, before they became critical issues.

This understanding of the dialectic of adaptation is related to the enterprise-wide nature of an ES, and in dealing with important user groups, the corporate user representative played a key role.

Existing literature

As stated in chapter 2 (section 4) contradictions may largely be understood on the basis of conflicting objectives and priorities between stakeholders, and that misalignment may emerge from interactions among stakeholders. The findings are therefore in line with literature emphasizing the importance of a stakeholder perspective in ES implementation (chapter 2, sections 3 and 4), and the need to study further ES implementation from a stakeholder perspective (section 2.4). The finding that the dialectic of adaptation was the result of diverging stakeholder viewpoints is therefore applicable beyond this case.

Level of the dialectic	**The corporate user representative's position in the dialectic**
Tensions between the corporate user representative and the project group	"Is this really not possible to solve, with the products we bought?"
Tensions between the corporate user representative and the steering committee	"We have a problem here, what we bought turned out to be less flexible than we thought"
Tensions between the corporate user representative and the reference group	"We have to change the scope, [we need to] do things differently, and the solution will be different from what we decided"

Table 13. Snapshots of the dialectic of adaptation between the corporate user representative and actors at different project levels (Table 7 in publication 4, p 7)

Contributions

The finding that the dialectic of adaptation was the result of diverging stakeholder viewpoints contributes to the existing literature by focusing on an important role in the case. The identification of the corporate user representative role is a new contribution to the literature. This role was established due to the early experiences in the project and this role is one way to address the stakeholder focus in the literature. Following this lead from the case, research question 3 is answered by an analysis of the corporate user representative role.

5.3. Research question 3

Q3. How can we constructively deal with contradictions in enterprise system implementations?

The answers to this research question are presented in publications 4 and 5. In line with the literature reviewed (chapter 2 section 5) and the last contribution to the research questions presented above (section 5.2.5), this question is answered in terms of what is needed to constructively deal with contradictions that result from diverging stakeholder viewpoints.

In this ES implementation process, the key stakeholders were the business units with their users. The dialectic of adaptation was to a large extent dealt with by the corporate user representative role (publication 4). The answers provided to research question Q3 are therefore narrowed down to answer the question: What were the essential characteristics for the corporate user representative role in this case? Answers are in publication 4 provided by describing the role in broad terms, whereas publication 5 provides answers by describing the role in terms of organizational influence processes.

Applying the social actor concept (chapter 2, Table 1), the characteristics of the role are classified along two dimensions as outlined in Table 14. These were essential characteristics for the single most important role dealing with the dialectic of adaptation in this ES implementation process. Table 14 therefore summarizes the answers to research question Q3 as found in this case, and the answers are elaborated in the following. Each social actor dimension is discussed separately, with reference to the existing literature.

Social actor dimension	**Essential characteristics**	**Description**	**Source**
Interaction	A good listener with political skill	The interactions require a good communicator with political skill, able to negotiate unifying decisions	Publication 4
Identity	A management level change agent	The corporate user representative role needs domain and technical competence, and it is important for the role to have an identity that avoids upward influence processes	Publications 4 and 5

Table 14. Two essential social actor dimensions of the corporate user representative role

5.3.1. The interaction dimension

To deal with the dialectic of adaptation in this complex ES context, the interaction dimension constituted a key issue (publication 4). The corporate user representative was appointed as a single point of contact between the business units and the project. Based on discussions with the business units, requirements were communicated by the corporate user representative to the project. The role also communicated results back to the business units, which included the scope of the solution's next version and explanations for constraints and limitations (c.f. Table 13).

The corporate user representative's interaction dimension required a good communicator with political skill, able to negotiate unifying decisions. The single most important characteristic emphasized by the informants was being a good listener. A good communicator was understood as a good listener who is open to ideas (s)he does not necessarily agree with, and who engages the users to give input. It is someone who verifies her/his own understanding, and has the ability to speak plainly, including the ability to say "no". Another keyword used to describe the interaction dimension of the role is "facilitator". Consensus building was another aspect of this characteristic, as the role is described as one who navigates between the actors. A consensus builder means being able to find unifying solutions and talking through a common priority with the business units instead of making decisions by voting. To achieve this, the corporate user representative needed political skill, which was confirmed as important by all the informants (publication 4). Political skill was described with words such as "a good share of personal power" and "having weight in the organization", i.e. the power to prepare for decisions.

Existing literature

The reviewed ES literature does not directly address research question 3. The literature reviewed in chapter 2 (section 4) addresses what should be done, but not how. Of the concepts presented in the literature review (section 2.5), two in particular are related to these research results:

- The multidimensional concept of the user as a social actor
- The concept of political skill.

Another related concept described in chapter 2 (section 4) is the ERP project champion.

Contributions

The interaction characteristics presented in publication 4 contributes to the existing literature in several ways. First of all, it contributes to a social actor perspective on the corporate user representative by presenting essential interaction characteristics needed by this role. Secondly, this research contributes by identifying political skill as essential to the corporate user representative role. The political skill concept (chapter 2, section 5) appears to be a pertinent summary of several of the corporate user representative's interaction aspects. Necessary personal characteristics of the role that fit political skill include: personal power, accumulated personal capital, and the power to shape and prepare for decisions (Table 15). The following keywords used to describe the role, also fit with the political skill concept: facilitator, broker and catalyst. A third way this research contributes to the existing literature, is that the interaction dimension (chapter 2, section 5) of this social actor should include political skill. Political skill has not previously been applied to study users or user representatives in ES implementation.

The corporate user representative role's interaction had a different focus than and went beyond the project champion of ERP projects (chapter 2, section 4). More than ensuring acceptance and diffusion of the ES project, the interactions' main emphasis was on communicating requirements to the project. This also differs from a user-developer communication, where developers interpret messages from users, set priorities and take action (chapter 2, section 5). The corporate user representative received and interpreted messages from users, had priorities set and prepared for decisions.

5.3.2. The identity dimension

To deal with the dialectic of adaptation in this ES context, the identity dimension constituted another key issue (Table 14). Political skill is also part of identity, as this skill overlaps the two dimensions. As part of the identity dimension, it was critical for the corporate user representative to have personal power, good reputations and a history in the enterprise (publication 4). Further research is needed to focus on which aspects of political skill are the most important for the corporate user representative role.

Although essential, political skill appeared insufficient to be able to deal with the dialectic of adaptation. To represent the organization's business units, an important finding is that this has to be a management role (publication 4). It required a management level role to represent more than 26.000 users in business units with different interests and to secure clear instructions for the project.

The management level identity of the role has been explored through organizational influence processes, and these account for important differences between the three individuals who had the role as corporate user representatives (publication 5). The directions of influence vis-à-vis steering committee, project group and reference group are summarized in Table 15. Corporate user representative No. 2 had a higher formal position than the others. In terms of organizational influence processes he had lateral and downward influence processes and therefore avoided the problematic upward influence. This identity dimension of the corporate user representative is described in different ways by the informants: (i) a history in the organization, (ii) the right standing in the organization, (iii) he performed a management function, (iv) he avoided play-offs, (v) powerful and directing, considered beneficial by the project manager. For the identity dimension of the corporate user representative as a social actor, one should therefore take into account organizational influence processes. Due to the complexity and scope of an ES, the corporate user representative role required an individual coming from a high enough formal position to avoid upward influence processes. This was essential to deal with the dialectic of adaptation and is therefore an important criterion to look for when such a role is to be filled (publication 5).

Vis-à-vis	**Representative No. 1**	**Representative No. 2**	**Representative No. 3**
Steering committee	Upward influence	Lateral influence	Upward influence
Project group	Lateral influence	Downward influence	Lateral/ Downward influence
Reference group	Lateral influence	Downward influence	Lateral/ Downward influence

Table 15. The organizational influence processes of the corporate user representatives (Table 3 in publication 5)

Another essential characteristic related to the identity dimension was a combination of domain competence and technical competence (publication 4). Ideally the role should be knowledgeable of all the application domains in the solution, to match the discussion partners' competence. Technical competence means an ability to understand the totality of the solution and the long term technical consequences of the suggested requirements.

Existing literature

The ES literature reviewed in chapter 2 (section 4) addresses what should be done, but does not address how to deal with contradictions. However, the following findings of the ES implementation literature (chapter 2, sections 4 and 5) provide a background for these results:

- ES stakeholders often have conflicting objectives and priorities
- Users are given more attention in the shakedown and onward and upward phases
- There is a fine balance of power to be maintained between the stakeholder groups in order to achieve a harmonious outcome
- An appropriate resolution of package–organisation misalignment may emerge from interactions among the various implementation stakeholders.

The concepts presented in the latter part of the literature review (section 2.6) are applied to achieve these research results. This includes the application of power through the theory of organizational influence processes (Porter et al., 2003). In addition, the multidimensional concept of the user as a social actor (Lamb and Kling, 2003) is used as an organizing framework. Political skill (Ferris et al., 2000) is another concept applied in this research.

Contributions

Based on the framework of organizational influence processes, these findings contribute as follows. The corporate user representative was a key role in dealing with the dialectic of adaptation in this case. This contribution addresses interactions among stakeholders by describing the corporate user representative role, which addresses the need for management of user participation (chapter 2, section 3). The corporate user representative in this case addressed the following concerns from the literature: (i) to deal with conflicting objectives and priorities among ES stakeholders (Sedera et al., 2004), (ii) to give users attention earlier than what is normally done in the shakedown phase (Markus and Tanis, 2000), and (iii) to maintain a balance of power between stakeholder groups (Skok and Legge, 2002). As typical with ES (chapter 2, section 4), users in this case had multiple and often conflicting objectives and priorities. Still they were, to a large extent, able to agree on project priorities by means of the corporate user representative role as a broker and facilitator.

The findings from this case also add to the identity dimension (chapter 2, section 5) of the corporate user representative role. In publication 5 the contribution is to propose that the identity dimension should be so that the role avoids upward influence processes. The role needed an identity dimension that enabled lateral influence processes. One of the individuals who entered the corporate user representative role had a higher formal position than the others, and therefore avoided the problematic upward influence. To avoid the challenging upward influence and rather attempt lateral influence is line with Porter et al., (2003). Another contribution is that to describe this social actor, political skill has to be part of the identity dimension.

Applied to the corporate user representative role above, Lamb and Kling's (2003) social actor concept has been useful to categorize essential identity dimension characteristics. Organizational influence processes provided a useful theoretical lens to analyze important individual differences regarding the application of power by the different individuals who had the role as corporate user representative.

These findings are related to the corporate user representative role and should be independent of technology. They address a general concern of diverging stakeholder viewpoints in the ES literature (c.f. chapter 2). These findings should therefore apply beyond this case, with the possible exception of ERP projects. The reason is that the corporate user representative role in this case has a different focus than the project champion of ERP projects.

5.4. Summary of contributions

A summary of the contributions this thesis makes to advancing existing knowledge of the ES implementation process, is presented in Table 16.

As seen in Table 16 this thesis contributes to the existing body of knowledge by providing several answers to the research questions. It contributes to a dialectic understanding of the ES implementation process, and addresses the challenge of representing users in the process. A main contribution is an analysis of the corporate user representative role in this case, in view of theories that are relevant for essential characteristics for this role.

Research question	Contributions	Related to previous research
Q1. What are the main contradictions when implementing enterprise systems?	The main contradiction found was termed the dialectic of adaptation. It was a contradiction between an ”out-of-the-box” implementation of commercial software and an implementation fulfilling the organization’s requirements of solution integration and user experience.	The contribution in this case extends previous research by a description of the issues involved in the dialectic of adaptation. The enterprise system is a different context of study than previous ERP research.
Q2. How can we understand contradictions in enterprise system implementations?	The vendors’ challenging dialectic of design is one way to understand why the dialectic of adaptation occurred in the implementation process.	This is a new contribution. It helps to understand package-organization misalignments reported in previous research.
	The dialectic of adaptation could be understood early in the chartering phase by focusing on perceived customization needs.	This is a new contribution.
	The dialectic of adaptation could in the project phase be understood: 1. As emerging in the ES implementation process, it could be traced back to the project strategy 2. As a dialectic motor of change in combination with the teleological and life cycle motors of change 3. As the resulting of diverging viewpoints on functionality, advocated by user groups from different domains.	1. The finding that the dialectic of adaptation can be traced back to the project strategy is new. The emergent dialectic occurred in the project phase, earlier than the shakedown phase of ERP dialectics in previous research. 2. The finding that all four motors of change are relevant when theorizing about ES implementation, is a new contribution. 3. This is in line with previous research, that diverging viewpoints on functionality are advocated by user groups
Q3. How can we constructively deal with contradictions in enterprise system implementations?	The establishment of a corporate user representative role was one important way to deal with the dialectic of adaptation in this case. Essential characteristics for this role included two social actor dimensions: 1. The role’s interaction dimension presupposed a good listener and communicator with political skill 2. The identity dimension implied that organizational influence processes should be considered carefully, in order to achieve lateral influence processes.	The description of the corporate user representative role is a new contribution. The role goes beyond the ERP project champion, and represents one way to deal with concerns that have been expressed in the ES literature. A social actor perspective on the role is new. 1. Political skill is a new contribution to the interaction dimension, and 2. organizational influence processes is a new perspective on the identity dimension.

Table 16. Summary of this thesis’ contributions to research

6. Conclusion

This thesis explores an enterprise system implementation process, with a focus on understanding main contradictions and what is needed to deal with these contradictions. This chapter summarizes the contributions presented in chapter 5, presents limitations as to how these contributions may be generalized, and outlines further research opportunities.

6.1. Contributions to knowledge

Three research questions were raised in chapter 1. The first research question was: What are the main contradictions when implementing enterprise systems? This question was first addressed by studying the literature presented in chapter 2, and by doing a longitudinal case study as described in chapter 3. This work has been documented in publication 3. As seen in the discussion in chapter 5, the answer to this question was termed the dialectic of adaptation. The dialectic of adaptation was important as it raised a number of highly critical issues that had to be solved before the solution could be deployed. This dialectic was an important answer for another reason too, it went beyond what previous research had established. The explicit description of the issues involved in the dialectic of adaptation was different from and added to previous research on misalignments. Furthermore, the dialectic of adaptation occurred in the project phase, which was earlier than in previous research on shakedown phase dialectics. The answer to the first research question also emphasized how difficult it is to achieve an ”out-of-the-box” implementation of an enterprise system while fulfilling the organization’s requirements. The answer to research question one pointed out that to satisfy unique needs with generic software is a challenge for enterprise systems. The case study shows that this challenge still remains to be solved. There is no reason to assume that the two main concerns of solution integration and user experience are unique to this case. Although the dialectic of adaptation concretized detailed critical issues unique to this case, the first research question remains a relevant question for understanding the ES implementation process in other contexts.

The second research question was: How can we understand contradictions in enterprise system implementations? Given the dialectic of adaptation in answer to research question 1, this question has been addressed in several ways. This question was addressed by studying the vendors’ challenging dialectic of design, as documented in publication 1. The question was further addressed by studying perceived customization needs early in the chartering phase of the longitudinal case, as documented in publication 2. This question was also addressed by studying how contradictions emerged in the project phase, as part of a hybrid theoretical pattern of organizational change, and as the result of diverging viewpoints among user groups. This work has been documented in publication 3. As seen in chapter 5 the main contribution to research question two is that we can understand how contradictions emerged in the project phase. Contradictions emerged as they were part of a hybrid pattern of change where a dialectic motor worked in combination with a teleological and a life cycle motor of change. Another equally important contribution to research question two is that we can also understand contradictions as the result of diverging viewpoints among user groups. These answers address both how and why contradictions emerged in the enterprise system implementation studied. These answers are important for another reason. They extended what previous research had established. Firstly, contradictions emerged earlier than established by previous research as they were latent already in the project strategy. Secondly, contradictions

were part of a hybrid theoretical pattern of organizational change, not established by previous research on enterprise systems. The final answer given to question two in chapter 5 is already established by previous research, but is relevant for another reason. To understand this complexity of contradictions is necessary in order to be able to deal constructively with them. The findings of this thesis point to several perspectives that add to an understanding of the dialectic of adaptation. As stated in chapter 5, these findings should also apply beyond this case. Although the answers contribute to our understanding of contradictions in enterprise system implementations, the second research question is still relevant. There may be other perspectives for understanding contradictions in the ES implementation process than the ones presented here. Understanding is a precondition for dealing constructively with contradictions.

The third research question was: How can we constructively deal with contradictions in enterprise system implementations? As pointed out in chapter 5, the reviewed ES literature does not directly address research question 3. This question has been addressed through the longitudinal case study described in chapter 3, and this work has been documented in publications 4 and 5. As seen in chapter 5, the main contribution to answer this question has been a description of a key role as corporate user representative. This role required characteristics along two social actor dimensions, the interaction dimension and the identity dimension. The description of the corporate user representative role is important because this was a critical role in dealing with the dialectic of adaptation. The corporate user representative was different from the previously known project champion role of ERP, and the description of this role in a social actor perspective was new. The need for political skill was a new contribution to the interaction dimension, and organizational influence processes was a new perspective on the identity dimension of the role. The answer to question three is relevant since it addressed the challenging management of user participation, and pointed out some essential characteristics for a key role in the case studied. The answer to question three is also relevant because contradictions resulted from diverging viewpoints on functionality advocated by user groups from different domains. As stated in chapter 5, these findings address a general concern of diverging stakeholder viewpoints and should apply beyond this case. Although the findings of this thesis described important characteristics for the corporate user representative, the answers are not exhaustive. For this reason the third research question is still a relevant question for future ES implementation projects.

6.2. Implications for practice

This research has several implications for practice. First of all, an awareness of the different motors of change could in itself facilitate the management of complex ES projects. A teleological justification for initiating an ES project may seem logical in the beginning, together with the life-cycle motor addressing the need for systematic retention of previous applications. However, an awareness of the dialectic and evolutionary motors may be needed to be prepared for changes in the plans. Although the teleological and the life cycle motors of change were actively used to manage the implementation process in this case, the dialectic of adaptation emerged over time. This emergence indicates that a conscious strategy of looking for contradictions and pursuing a constructive synthesis could help manage large scale ES projects. In practice one should look for contradictory strategic goals. One should also expect diverging viewpoints among user groups in the project phase, and one may anticipate these by appointing a carefully selected corporate user representative. Thus to anticipate dialectics at an early phase may help to reduce conflicts at solution rollout.

Another implication for practice comes from the way the Statoil case sheds light on the dialectic motor of strategic ES implementations. The dialectic of adaptation pinpoints two issues to be aware of in ES implementations, i.e. solution integration and a simplified user experience. The dialectic motor of change was powered by inherent contradictions in the project strategy, by the integration of acquired software with existing IT infrastructure, and by the diversity of user groups. That contradictions resulted from diverging viewpoints on functionality and were advocated by user groups from different domains, is a reminder of the need for management of user participation. The establishment of the corporate user representative role based on the early experiences of this case is certainly relevant for practice. It shows one practical way to anticipate and deal with contradictions in the ES implementation process, namely by establishing such a role. To find a suitable candidate for a corporate user representative role, the interactions and identities dimensions should be carefully considered. This has implications for project management practice too. Instead of a project manager handling requirements, a separate role of corporate user representative can relieve this responsibility from project management.

Thus the experiences of this case provide relevant insights for future ES implementation projects, with the limitations discussed below.

6.3. Limitations

The validity and limitations of data collection and data analysis activities were discussed in chapter 3. The limitations presented here concern generalizability. In an interpretive approach, generalizability has a different meaning than in positivist research (Lee and Baskerville, 2003). Generalizations should be seen as explanations of particular phenomena derived from empirical interpretive research in specific settings, which may be valuable in the future in other organizations and contexts (Walsham, 1995).

The observations made in the longitudinal case study are generalized to concepts such as social actors with political skill, and to theory such as the four motors of organizational change. The observations are also generalized to specific implications such as the establishment of a corporate user representative role, and to rich insight such as how the dialectic of adaptation emerged from being only latent in the project strategy. All these examples involve generalizing from empirical statements reflected in the case to theoretical statements. Generalizing from description of observations to theory is in line with Lee and Baskerville (2003), and the use of theory clearly distinguishes interpretive research from just anecdotes (Klein and Myers, 1999).

In addition to these generalizations, chapter 5 describes how each of the findings may be relevant beyond this case. The specific setting of the longitudinal case study described in chapter 3 provides some general limitations on how the findings from this case may be generalized:

1. The findings are from a solution that is a combination of collaboration and information management technologies.
2. The time of study is mainly the chartering and project phases, with only a few interviews early in the shakedown phase.
3. The informants mainly represent the project perspective.

4. The focus is to a large extent limited to the dialectic of adaptation. The literature reviewed in chapter 2 suggests that this dialectic is valid for ERP implementations as well as the system studied here. The understandings of the dialectic of adaptation presented in this thesis are related to the enterprise-wide dimension of these systems, and should therefore be applicable to other enterprise systems.
5. The study describes one way to deal with contradictions, to handle different user groups in ES implementation projects by appointing a corporate user representative role. To deal with contradictions, this role may be valid for many enterprise system implementations. However, it may not apply to ERP systems as the corporate user representative role is different form the ERP project champion role.

6.4. Further research

The contributions of this thesis raise issues for future research. Further research should be conducted beyond the mainstream teleological and life-cycle-based theorizing, by considering all four motors of change. Such research could well focus on ES implementation processes in other contexts than ERP. Thus the results of this thesis could be compared with findings from other kinds of large-scale ES. In particular, to follow an ES project from the inside could give rich insights. Further research could also focus more on solution rollout and the shakedown phase of ES implementation processes.

Further research on pre-implementation considerations would be interesting to establish whether the vendors' dialectic of design and dialectic rhetoric (c.f. publication 1) contributes to the chartering phase sense of technological determinism described in chapter 2 (section 3).

Further research on the corporate user representative role could focus on which aspects of political skill are most important for such a role. Further research could also explore organizational influence processes within the reference group, i.e. the composition of the reference group to ensure lateral influence processes within the group.

To conclude, this thesis contributes to an increased understanding of how contradictions are part of the process of implementing standard enterprise systems in unique organizations. Based on this increased understanding, this thesis suggests a way to constructively deal with contradictions. These findings may be relevant both for research and practice, to improve ES implementation in the future.

7. References

Allen, J.P. (2005). Value conflicts in enterprise systems. Information Technology & People, 18(1): 33-49.

Al-Mashari, M., Al-Mudimigh, A., Zairi, M. (2003). Enterprise resource planning: A taxonomy of critical factors. European Journal of Operational Research, 146: 352–364.

Al-Mashari, M., Zairi, M., Okazawa, K. (2006). Enterprise resource planning (ERP) implementation: A useful road map. International Journal of Management and Enterprise Development, 3(1/2): 169-180.

Aloini, D., Dulmin, R., Mininno, V. (2007). Risk management in ERP project introduction: Review of the literature. Information & Management, 44: 547–567.

Andersen, R. (2008). The rhetoric of enterprise content management (ECM): Confronting the assumptions driving ECM adoption and transforming technical communication. Technical Communication Quarterly, 17(1): 61–87.

Baskerville, R. and Smithson, S. (1995). Information technology and new organizational forms: Choosing chaos over panaceas. European journal of information systems, 4(2): 66-73.

Beatty, R.C. and Williams, C.D. (2006). ERP II: Best practices for successfully implementing an ERP upgrade. Communications Of The ACM, 49(3): 105-109.

Besson, P. and Rowe, F. (2001). ERP project dynamics and enacted dialogue: Perceived understanding, perceived leeway, and the nature of task-related conflicts. SIGMIS Database, 32(4): 47–66.

Bjerknes, G. (1992). Dialectical reflection in information systems development. Scandinavian Journal of Information Systems, 4: 55–77.

Boonstra, A. (2006). Interpreting an ERP-implementation project from a stakeholder perspective. International Journal of Project Management, 24: 38–52.

Botta-Genoulaz, V., Millet, P.-A., Grabot, B. (2005). A survey on the recent research literature on ERP systems. Computers in Industry, 56: 510–522.

Braa, K. and Vidgen, R. (1999). Interpretation, intervention, and reduction in the organizational laboratory: A framework for in-context information system research. Accounting, Management and Information Technologies, 9(1): 25-47.

Brown C. and Vessey, I. (1999). ERP implementation approaches: toward a contingency framework. Proceeding of the 20th international conference on Information Systems, Charlotte, North Carolina, U.S.: 411–416.

Bühne, S., Lauenroth, K. and Pohl, K. (2005). Modelling requirements variability across product lines. 13th IEEE International Conference on Requirements Engineering, Paris, France, IEEE Computer Society: 41-50.

Butler, T. and Fitzgerald, B. (1999). Unpacking the systems development process: An empirical application of the CSF concept in a research context. Journal of Strategic Information Systems, 8: 351–371.

Clegg, S.R., da Cunha, J.V., e Cunha, M.P. (2002). Management paradoxes: A relational view. Human Relations, 55(5): 483-503.

CMS Watch (2005). CMS watch vendor lists. http://www.cmswatch.com/Reports/Vendors/ (accessed 29.10.2005).

Cohen, A.R and Bradford, D.L. (2003). Influence without authority: The use of alliances, reciprocity, and exchange to accomplish work. In Porter, L.W., H.L. Angle, R.W. Allen, (eds.): Organizational Influence Processes, New York, M. E. Sharpe: 384-394.

Coplien, J., Hoffman, D., and Weiss, D. (1998). Commonality and variability in software engineering. IEEE Software, 15(6): 37-45.
Dahlbom, B. and Mathiassen, L. (1993). Computers in context: The philosophy and practice of systems design. Cambridge, Mass., NCC Blackwell.
Damodaran, L. (1996). User involvement in the systems design process - A practical guide for users. Behaviour & Information Technology, 15(6): 363-377.
Davenport, T. H. (1998). Putting the enterprise into the enterprise system. Harvard Business Review, 76(4): 122-131.
Davenport, T.H. (2000). Mission critical: Realizing the promise of enterprise systems. Boston: Harvard Business School Press.
Dery, K., Grant, D., Harley, B. and Wright, C. (2006). Work, organisation and enterprise resource planning systems: An alternative research agenda. New Technology, Work and Employment, 21(3): 199-214.
Donaldson, T. and Preston, L.E. (1995) The stakeholder theory of the corporation - Concepts, evidence, and implications. Academy of Management Review, 20(1): 65-91.
Esteves, J. and Bohorquez, V. (2007). An updated ERP systems annotated bibliography: 2001-2005. Communications of the AIS, (19): 386-446.
Ferris, G. R., Perrewé, P. L., Anthony, W.P. and Gilmore, D.C. (2000). Political skill at work. Organizational Dynamics, 28(4): 25-37.
Finney, S. and Corbett, M. (2007). ERP implementation: A compilation and analysis of critical success factors. Business Process Management Journal, 13(3): 329-347.
Fortune, J. and White, D. (2005). Framing of project critical success factors by a systems model. International Journal of Project Management, 24: 53–65.
Freeman, R.E. (1984) Strategic management: A stakeholder approach. Boston, Pitman.
Gallivan, M. J. and Keil, M. (2003). The user-developer communication process: A critical case study. Information Systems Journal, 13(1): 37-68.
Goleman, D. (2003). What makes a leader? In Porter, L.W., et al., (eds.): Organizational Influence Processes, New York, M. E. Sharpe: 229-241.
Grant, D., Hall, R., Wailes, N. and Wright, C. (2006). The false promise of technological determinism: The case of enterprise resource planning systems. New Technology, Work and Employment, 21(1): 2-15.
Grover, V., Lederer, A.L. and Sabherwal, R. (1988). Recognizing the politics of MIS. Information and Management, 14(3): 145-156.
Gulla, J.A. (2004). Understanding requirements in enterprise systems projects. Proceedings of the 12th IEEE International Requirements Engineering Conference (RE'04), IEEE: 176-185.
Hanseth, O. and Braa, K. (1998). Technology as traitor. SAP infrastructures in global organizations. In Hirscheim, R, Newman M and Degross JI (eds.): Proceedings from 19th International Conference on Information Systems (ICIS), Helsinki, Finland: 188–196.
Howcroft, D. and Light, B. (2006). Reflections on issues of power in packaged software selection. Information Systems Journal, 16(3): 215-235.
Israel, J. (1979). The language of dialectics and the dialectics of language. Copenhagen, Munksgaard.
Jasperson, J. S., Carte, T. A., Saunders, C.S., Butler, B.S., Croes, H.J.P. and Zheng, W. (2002). Review: Power and information technology research: A metatriangulation review. MIS Quarterly, 26(4): 397-459.
Kerr, S. (2003). On the folly of rewarding A while hoping for B. In Porter, L.W., et al. (eds.): Organizational Influence Processes New York, M. E. Sharpe: 142-150.

Kipnis, D. and Schmidt, S.M. (2003). Upward-influence styles: Relationship with performance evaluations, salary and stress. In Porter, L.W., et al. (eds.): Organizational Influence Processes, New York, M. E. Sharpe: 446-461.
Kirchmer, M. (1999). Business process oriented implementation of standard software: How to achieve competitive advantage efficiently and effectively. 2nd ed. Springer-Verlag, Berlin.
Klein, H. K. and Myers, M.D. (1999). A set of principles for conducting and evaluating interpretive field studies in information systems. MIS Quarterly, 23(1): 67-93.
Kling, R. and Iacono, S. (1984). The control of information systems developments after implementation. Communications of the ACM, 27(12): 1218-1226.
Kotter, J.P. (2003). Power, dependence, and effective management. In Porter, L.W., et al. (eds.): Organizational Influence Processes, New York, M. E. Sharpe: 127-141.
Kræmmergaard, P., Møller, C. and Boer, H. (2003). ERP implementation: an integrated process of radical change and continuous learning. Production Planning & Control, 14(4): 338–348.
Kumar, K. and Van Hillegersberg, J. (2000). ERP experiences and evolution. Communications of the ACM, 43(4): 23–26.
Lamb, R. (2006). Alternative paths toward a social actor concept. Proceedings of the Twelfth Americas Conference on Information Systems, Acapulco, Mexico: 4113-4123.
Lamb, R. and Kling, R. (2003). Reconceptualizing users as social actors in information systems research. MIS Quarterly, 27(2): 197-235.
Langley, A. (1999). Strategies for theorizing from process data. Academy of Management Review, 24(4): 691-712.
Lee, A.S. and Baskerville, R.L. (2003). Generalizing generalizability in information systems research. Information Systems Research, 14(3): 221-243.
Lee, J.C. and Myers, M.D .(2004). Dominant actors, political agendas, and strategic shifts over time: a critical ethnography of an enterprise systems implementation. Journal of Strategic Information Systems, 13(4): 355–374.
Leishman, D.A. (1999). Solution Customization. IBM Systems Journal, 38,1: 76-97.
Lewis, M.N. (2000). Exploring paradox: Towards a more comprehensive guide. Academy of Management Review, 25(4): 760-776.
Liang, H. and Xue, Y. (2004). Coping with ERP-related contextual issues in SMEs: A vendor's perspective. Journal of Strategic Information Systems, 13: 399-415.
Loonam, J. and McDonagh, J. (2005). Principles, foundations & issues in enterprise systems. In Lau, L.K. (ed.): Managing business with SAP: Planning implementation and evaluation. Idea Group Publishing: 1-32.
Luo, W. and Strong, D.M. (2004). A framework for evaluating ERP implementation choices. IEEE Transactions on Engineering Management, 51(3): 322-333.
Lynch, T. and Gregor, S. (2004). User participation in decision support systems development: Influencing system outcomes. European Journal of Information Systems, 13: 286-301.
Markus, M.L. (1983). Power, politics, and MIS implementation. Communications of the ACM, 26(6): 430-444.
Markus, M.L. (1997). The qualitative difference in IS research and practice. Proceedings of the IFIP TC 8 8.2 International Conference on Information Systems and Qualitative Research, Philadelphia: 11-27.
Markus, M.L and Mao, J.-Y. (2004). Participation in development and implementation - Updating an old, tired concept for today's IS contexts. Journal of the Association for Information Systems, 5(11-12): 514-544.
Markus, M.L. (2004). Technochange management: Using IT to drive organizational change. Journal of Information Technology, 19: 4–20.

Markus, M.L. and Tanis, C. (2000). The enterprise system experience – From adoption to success. In Zmud R.W. (ed.): Framing the Domains of IT Management: Projecting the Future Through the Past, Pinnaflex Education Resources, Cincinnati, Ohio: 173–207.

Markus, M.L., Axline, S., Petrie, D. and Tanis, C. (2000). Learning from adopters' experiences with ERP: Problems encountered and success achieved. Journal of Information Technology, 15: 245–265.

Mathiassen, L. and Nielsen, P.A. (1989). Soft systems and hard contradictions – Approaching the reality of information systems in organizations. Journal of Applied Systems Analysis, 16: 75–88.

Miles, M. B. and Huberman, A.M. (1994). Qualitative data analysis: An expanded sourcebook. Thousand Oaks, Calif., Sage.

Mitchell, R.K., Agle, B.R. and Wood, D.J. (1997) Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts. Academy of Management Review, 22(4): 853-886.

Munkvold, B.E. and Tvedte, B. (2003). Implementing a portfolio of collaboration technologies in Statoil. In Munkvold, B.E. (ed.): Implementing collaboration technologies in industry. London, Springer: 81-107.

Munkvold, B.E., Päivärinta, T., Hodne, A.K. and Stangeland, E. (2003). Contemporary issues of enterprise content management: The case of Statoil. In Ciborra CU, Mercurio R, De Marco M, Martinez M and Carignani A, (eds.): Proceedings of the 11th European Conference on Information Systems, CD-ROM, Naples, Italy.

Myers, M. D. (1994). Dialectical hermeneutics: A theoretical framework for the implementation of information systems. Information Systems Journal, 5: 51-70.

Nah, F. F-H. and Delgado, S. (2006). Critical Success Factors for Enterprise Resource Planning Implementation and Upgrade. Journal of Computer Information Systems, 46(5): 99-113.

Nah, F. F-H. and Lau, J.L.-S. (2001). Critical factors for successful implementation of enterprise systems. Business Process Management Journal, 7(3): 285-296.

Niehaves, B., Klose, K. and Becker, J. (2006). Governance theory perspectives on IT consulting projects: The case of ERP implementation. e-Service Journal, 5(1): 5-26.

Päivärinta, T. and Munkvold, B.E. (2005). Enterprise content management: An integrated perspective on information management. In Sprague JR RH, (ed.): Proceedings of the 38th Hawaii International Conference on System Sciences, CD-ROM, IEEE, Los Alamitos.

Patton, M.Q. (1990). Qualitative evaluation and research methods. Sage, Newbury Park, California.

Pettigrew, A.M. (1990). Longitudinal field research on change: Theory and practice. Organization Science, 1(3): 267–292.

Pettigrew, A.M., (1995). Longitudinal field research on change. In Huber, G.P. and A.H. Van de Ven. (eds.): Longitudinal Field Research Methods: Studying Processes of Organizational Change, Sage Publications, Thousand Oaks, California: 91-125.

Pettigrew, A.M., Woodman, R.W., and Cameron, K.S. (2001). Studying organizational change and development: Challenges for future research. Academy of Management Journal, 44(4): 697-713.

Porter, L.W., Angle, H.L. and Allen, R.W. (eds.) (2003). Organizational influence processes. 2nd ed. New York, M. E. Sharpe.

Robey, D. and Boudreau, M.-C. (1999). Accounting for the contradictory organizational consequences of information technology: Theoretical directions and methodological implications. Information Systems Research, 10(2): 167–197.

Robey, D., Ross, J.W. and Boudreau, M.-C. (2002). Learning to implement enterprise systems: An exploratory study of the dialectics of change. Journal of Management Information Systems, 19(1): 17–46.
Sabherwal, R. and Newman, M. (2003). Persistence and change in system development: A dialectical view. Journal of Information Technology, 18(2): 69–92.
Sarker, S. and Lee, A.S. (2003). Using a case study to test the role of three key social enablers in ERP implementation. Information & Management, 40: 813–829.
Scheer, A.-W. and Habermann, F. (2000). Enterprise resource planning: Making ERP a success. Communications of the ACM, 43(4): 57-61.
Scott, J.E. and Vessey, I. (2002). Managing risks in enterprise systems implementations. Communications of the ACM, 45(4): 74-81.
Seddon, P.B. (2005). Are ERP systems a source of competitive advantage? Strategic Change, 14: 283–293.
Sedera, D., Gable, G. G. and Chan, T. (2004). Measuring enterprise systems success: The importance of a multiple stakeholder perspective. Proceedings of the 13th European Conference on Information Systems, Turku, Finland.
Sia, S.K. and Soh, C. (2007). An assessment of package–organisation misalignment: Institutional and ontological structures. European Journal of Information Systems, 16: 568–583.
Skok, W, and Legge, M. (2002). Evaluating enterprise resource planning (ERP) systems using an interpretive approach. Knowledge and Process Management, 9(2): 72–82.
Smith, H.A. and McKeen, J.D. (2003). Developments in practice viii: Enterprise content management. Communications of AIS, 11(33): 1–26.
Soh, C. and Sia, S.K. (2004). An institutional perspective on sources of ERP package–organisation misalignments. Journal of Strategic Information Systems, 13: 375–397.
Soh, C. and Sia, S.K. (2005). The challenges of implementing vanilla versions of enterprise systems. MIS Quarterly Executive, 4(3): 373-384.
Soh, C., Sia, S.K., Boh, W.F. and Tang, M. (2003). Misalignments in ERP implementation: A dialectic perspective. International Journal of Human-Computer Interaction, 16(1): 81–100.
Somers, T.M. and Nelson, K. (2001). The impact of critical success factors across the stages of enterprise resource planning implementations. In Sprague JR RH, (ed.): Proceedings of the 34th Hawaii International Conference on Systems Sciences (HICSS-34), January 3-6, Maui, Hawaii. Los Alamitos CA: IEEE.
Somers, T.M. and Nelson, K. (2004). A taxonomy of players and activities across the ERP project life cycle. Information & Management, 41: 257–278.
Strong, D.M. and Volkoff, O. (2004). A roadmap for enterprise system implementation. IEEE Computer, 37(6): 22-29.
Umble, E.J., Haft, R.R. and Umble, M.M. (2003). Enterprise resource planning: Implementation procedures and critical success factors. European Journal of Operational Research, 146: 241–257.
Van de Ven, A.H. and Poole, M.S. (1995). Explaining development and change in organizations. Academy of Management Review, 20(3): 510-540.
Van Fenema, P.C., Koppius, O.R. and van Baalen, P.J. (2007). Implementing packaged enterprise software in multi-site firms: Intensification of organizing and learning. European Journal of Information Systems, 16: 584–598.
Wagner, E.L. and Newell, S. (2007). Exploring the importance of participation in the post-implementation period of an ES project: A neglected area. Journal of the AIS, 8(10): 508-524.

Walsham, G. (1995). Interpretive case studies in IS research: Nature and method. European Journal of Information Systems, 4(2): 74–81.
Walsham, G. (2006). Doing interpretive research. European Journal of Information Systems, 15: 320–330.
Wang, E.T.G., Chen, H.H., Jiang, J.J. and Klein, G. (2005). Interaction quality between IS professionals and users: Impacting conflict and project performance. Journal of Information Science, 31(4): 273-282.
Wang, E.T.G., Shih, S.-P., Jiang, J.J. and Klein, G. (2008). The consistency among facilitating factors and ERP implementation success: A holistic view of fit. The Journal of Systems and Software, 81: 1609–1621.
Ward, J., Hemingway, C. and Daniel, E. (2005). A framework for addressing the organisational issues of enterprise systems implementation. Journal of Strategic Information Systems, 14: 97–119.
Wei, H.-L., Wang E.T.G. and Pei-Hung, J. (2005). Understanding misalignment and cascading change of ERP implementation: A stage view of process analysis. European Journal of Information Systems, 14(4): 324-334.
Weill, P. and Olson, M.H. (1989). Managing investment in information technology: Mini case examples and implications. MIS Quarterly, 13(1): 3-17.
Yukl, G. and Tracey, J.B. (2003). Consequences of influence tactics used with subordinates, peers, and the boss. In Porter, L.W. et al. (eds.): Organizational Influence Processes, New York, M. E. Sharpe: 96-116.

Appendix A. Research publications

No.	Title	Published
1	Nordheim, S. (2007). Towards a dialectic understanding of Enterprise Systems – Vendor challenges and contradictory rhetoric	In Magyar, G. et al. (eds): Advances of Information Systems Development: New Methods and Practice for the Networked Society, vol 1. Springer, pp 11-22.
2	Nordheim, S. and Päivärinta, T. (2004). Customization of Enterprise Content Management Systems: An Exploratory Case Study	Proceedings of the 37th Hawaii International Conference of System Sciences, Big Island, Hawaii. IEEE. (CD-ROM)
3	Nordheim, S. and Päivärinta, T. (2006). Implementing Enterprise Content Management: From Evolution through Strategy to Contradictions Out-of-the-Box	European Journal of Information Systems, 15, pp 648–662.
4	Nordheim, S. (2008). Corporate User Representatives and the Dialectics of Enterprise Systems: A Quest for Social Actors with Political Skill	Proceedings of the 41st Hawaii International Conference on System Sciences, Big Island, Hawaii. IEEE. (CD-ROM)
5	Nordheim, S. and Nielsen, P.A. (2008). Enterprise System Implementations: Organizational Influence Processes for Corporate User Representatives	Proceedings of the 16th European Conference on Information Systems, Galway, Ireland. (CD-ROM)

Towards a Dialectic Understanding of Enterprise Systems – Vendor Challenges and Contradictory Rhetoric

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Abstract: Substantial Enterprise Systems (ES) research has focused on customers' implementation processes. This paper argues the need for a larger context to understand ES implementation. This context includes the fundamental challenge ES vendors are facing, how to satisfy unique needs with generic software. The designed solution to this challenge is analyzed, focusing on the two simple and yet fundamental concepts of commonality and variability. It is argued that the balance between commonality and variability may be viewed as a dialectic of design.

A study of ES vendors indicates that this dialectic of design is challenging. Finding an optimal balance between commonality and variability becomes an important design goal. This design challenge affects the customer directly. In the cases where variability is unable to meet the customer's requirements, a considerable pressure is applied by the vendor or implementation partner to make the customer adapt to the system. The study also demonstrates that leading ES vendors simultaneously promote both commonality and variability in their customer rhetoric, which may be viewed as dialectic. This rhetoric may even be considered paradoxical.

For customers the dialectic perspective on ES may shed light on the motivation behind the pressure applied by the vendor, and may prepare the customer for the contradictions likely to occur in the project and shakedown phases of ES implementations. For customers it is also important to understand the dialectic rhetoric in ES marketing, to be able to see through the dialectic rhetoric during the chartering phase.

1 Introduction

Enterprise Systems (ES) are commercial software packages that enable the integration of transaction-oriented data and business processes throughout an organization (Markus and Tanis, 2000). Two types of ES are studied here, Enterprise Resource Planning (ERP) and Enterprise Content Management (ECM).

ES represent an effort to apply generic software to meet the requirements of heterogeneous organizations. They may be viewed as a response to the challenge aptly formulated by Markus (1997): "the world around us is demanding that we find ways to satisfy unique needs with generic software and components". One may argue that the ES effort to satisfy unique needs with generic software implies a potential contradiction. This is a reasonable assumption as several studies have established the contradictory nature of ES implementations (Besson and Rowe, 2001; Robey et al., 2002; Soh et al., 2003; Wei et al., 2005).

A set of implementation choices may be viewed as a synthesis of the contradictory nature of ES implementations (Nordheim and Päivärinta 2006). Some generic ERP implementation choices are summarized by Luo and Strong (2004). These include three technical ERP customization options: module selection, table configuration and code modification.

This paper views the contradictory nature of ES implementations in a larger context, i.e. how ES vendors approach the challenge of solving the requirements of unique organizations with generic software solutions. The reason for focusing on such a larger context for ES implementations is two-fold. First of all, ES implementation involves a considerable knowledge transfer effort from the vendor to the customer (Lee and Lee, 2000). Secondly, according to Markus and Tanis (2000) misalignment issues and their resolutions in one phase may originate in previous project phases. An understanding of the vendor challenges may therefore be relevant for customers as a larger context for ES implementation.

There are two simple and yet fundamental design concepts used by ES vendors to address the challenge formulated by Markus (1997), namely the distinction between commonality and variability (C/V) (Leishman, 1999). Due to the contradictory nature of ES implementations, this paper takes a contradictory view of C/V in ES design, and raises the following question:

In a dialectic perspective, what are the ES vendor challenges related to the commonality/variability design issue, and what are the possible implications for ES customers?

Considerable ES research has focused on customer implementation issues, including dialectics (Besson and Rowe, 2001; Robey et al., 2002; Soh et al., 2003; Wei et al., 2005). Few studies have focused on ES vendors, one exception is Liang and Xue (2004).

First the concepts of commonality and variability (C/V) are presented, followed by the concepts of dialectics. An argument for a contradictory view of C/V is then presented. The empirical part is an interpretive study of nine ES vendors. The implications are discussed from an ES customer perspective, in relation to the ES implementation process and knowledge transfer.

1.1 Commonality and Variability in Enterprise Systems

Commonality and variability (C/V) is a characteristic of most software packages (Bühne et al., 2005). The general meaning of commonality is properties shared by all members of a group, and in software engineering commonality is expressed as

"an assumption held uniformly across a given set of objects" (Coplien et al., 1998). Commonality is designed as properties shared by all customers of an ES.

Variability is generally understood as properties varying within members of a group, and may be viewed as "an assumption true of only some elements of a given set of objects" (Coplien et al., 1998). In a software engineering context, variabilities are "bound" by placing specific limits on each of the variabilities. One example of bounded variability may be a range of legal values for a parameter (Coplien et al., 1998). Variable properties are designed to be changed by different customers of an ES.

Within ES the designed commonality may include: common business processes, functions, workflows, screens, technical infrastructure layer, data models, and common default parameter settings (Leishman, 1999). As an example, SAP's variability includes the organization model, the process model, the function model, the data model and subsequent table settings, how applications and services are distributed across the computational tiers, and the user interface of screens and screen flows. It also includes interoperability with other programs, and the ABAP/4 programming environment (Leishman, 1999).

ES represent both bounded variability (e.g. configuration) and variability that is not bounded, (e.g. user exits and programming). For a customer it is interesting to note that bounded variability is associated with only slight maintenance efforts, whereas variability that is not bounded is associated with heavy maintenance efforts (Brehm et al., 2001). Customization is one example of variability that is not bounded, and to avoid code customization is a strategic critical success factor (Somers and Nelson, 2001).

Different vendors will, of course, reach very different decisions about the right balance between C/V (Davenport, 1998). This is also shown in the cases presented later.

1.2 Dialectics

Dialectics is a way of thinking, based on contradictions. A contradiction can be seen as a relation between two opposite aspects of a phenomenon, called thesis and antithesis; where antithesis is the negation of the thesis. The two aspects of a contradiction are intrinsically related, yet opposite and distinct from one another, and one aspect in a contradiction cannot be fully understood without considering the other (Van de Ven and Poole, 1995).

In dialectical theory, stability and change are explained by reference to the balance of power between the two opposing entities. A thesis (A) may be challenged by an antithesis (Not-A), and the resolution of the conflict becomes a synthesis (which is Not Not-A). By its very nature, the synthesis is a novel construction that departs from both the thesis and the antithesis. Dialectics is about dynamics, as dialectical theory is one way of explaining development and change (Van de Ven and Poole, 1995).

According to Dahlbom and Mathiassen (1993), contradictions can in some cases surface as trade-offs: "From a dialectical perspective, these trade-offs are

manifestations of contradictions inherently related to the use and development of computer systems" (p63). Dialectic thinking is applied to the C/V concepts here, since dialectics contributes to the production of knowledge by an increased understanding of a phenomenon (Israel, 1979).

1.3 A dialectic view of C/V

Mechanisms for C/V are built into ES (Leishman, 1999), and commonality may be formulated as a thesis of ES design: "certain ES properties should not be subject to change". The thesis of commonality represents stability, and is true for a subset of the ES properties. The design idea behind commonality is that one should not change a certain property of the system, and one example is the ERP argument that the system contains "best practices" which should not be changed.

Variability may be formulated as an antithesis of ES design: "certain ES properties should be subject to change". The antithesis of variability represents change, and is true for a subset of the ES properties. The design idea behind variability is that one should be able to change a certain property of the system, as each customer is unique and requires a solution adapted to its requirements. Customers vary and their contexts may be different, therefore the system needs to have variable properties.

So for each ES property there is a design decision: whether the property should be subject to change or not. This design decision can therefore be viewed as contradictory, where one decision represents the opposite of the other (Figure 1).

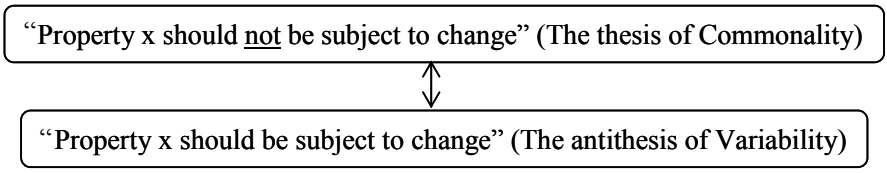

Fig. 1. The C/V design decision viewed in a dialectic perspective

If one accepts the thesis and antithesis as expressed in Figure 1, the C/V design decision of ES may be viewed in a dialectic way. An ES may then be viewed as a synthesis: some properties of the system can and should be subject to change, other properties of the system should not be subject to change. A design with 100% commonality would imply a rigid system, easy to install, but with an inflexibility that is completely unacceptable for a complex ES. A design with 100% variability would imply a total flexibility where every property had to be specified, a formidable installation effort and a completely meaningless situation for a complex ES. The synthesis is therefore a balance between commonality and variability, and represents the vendor's effort to satisfy unique customer needs with generic software. This study explores how the C/V balance is viewed by ES vendors, and possible consequences for ES customers.

2 Method

The study has been guided by the principle of the hermeneutic circle, combined with the principle of dialogical reasoning (Klein and Myers, 1999). Following an initial literature review, interviews were made with representatives from two ES vendors and one implementation partner. The two ES vendors were eZ Systems, one larger ECM vendor; and MultiPlus, a smaller ERP vendor. The implementation partner represented Agresso, a larger ERP vendor.

Six informants were interviewed, two for each system. They had 5-15 years' implementation experience. The interviews have been carried out by the author as qualitative, open interviews based on an interview guide. Dialectics was used as a "sensitizing concept" (Patton, 1990) to guide data collection and analysis. The interviews lasted ca 40 minutes each; they were audio-taped and transcribed. Using Atlas.ti for data analysis, the interviews were coded according to the following categories: commonality, variability, the C/V balance, adaptation of system and adaptation of organization.

The findings were followed up with a document analysis of vendor statements published on the web. Six dominant vendors were selected, to supplement the interview data. These included SAP, together with five major ECM vendors presented in the CMS report (CMS Watch, 2006) as providing enterprise platforms. Table 1 provides an overview of the data sources used.

Table 1. Data sources used in the study

Type of ES	Vendor	Type of data
ERP	Agresso	Interviews, transcribed and coded
	MultiPlus	Interviews, transcribed and coded
	SAP	Web documents
ECM	eZ Systems	Interviews, transcribed and coded
	FileNet	Web documents
	Vignette	Web documents
	Documentum	Web documents
	Interwoven	Web documents
	Stellent	Web documents

3. Cases

Two of the three cases where interviews were carried out, are described, since they provided interesting insights. The third case was a small ERP vendor, MultiPlus (www.multiplus.as). This case confirmed the findings from the two first cases, without adding new insights. Hence, it is left out of the description. The six vendors which were subject to document analysis are not described, only web references are given for these.

3.1 Agresso

Case number one is the Agresso ERP system (www.agresso.com), based in the Netherlands. With more than 2300 customers in 70 countries, Agresso offers solutions both to public and private sectors. Two interviews were carried out with the Agresso product manager at one of their main implementation partners in Norway. Another interview was with a hired consultant who was the project manager for a large Agresso implementation project. He had 15 years of experience with implementing Agresso for customers.

Commonality is heavily emphasized by Agresso. This is seen in their emphasis on complete solutions for public and private sectors. Variability is also emphasized, and is mainly provided by frameworks. Frameworks include customization and configuration tools. According to the informants, frameworks are only customized at national and business sector levels. At the customer level frameworks are in principle not customized, and the only variability mechanism recommended at customer level is configuration. Variability is also described as a "templated approach" to implementation (Agresso, 2005).

The Agresso product manager pointed out what he considered a puzzling phenomenon. On the one hand, Agresso provides a powerful customization tool that includes VBA interfaces (Visual Basic for Applications). On the other hand, Agresso emphasizes the importance of a limited configuration. According to the informant, this may indicate a rather ambiguous attitude to variability.

According to the informants, it appears that the more flexible the ES is in terms of configuration, the more customer pressure there is likely to be to configure rather than change the organization. Handling such pressure is considered a vital role of the consultant. From an implementation partner perspective, variability should not automatically imply an adaptation of the ES. The Agresso product manager advised against a mere ES configuration without a preceding organizational development process. As an illustration the Agresso implementation at the municipality of Oslo was cited, where the need for reports was reduced from around 1600 to 100.

3.2 eZ Systems

Case two is eZ Systems (http://ez.no/), an Open Source ECM vendor with 30-40 thousand downloads per month. eZ Systems' idea is to provide flexible solutions rather than "off-the-shelf" software. One of the informants has a split role between management of customer projects and programming, the other informant is responsible for all customer projects in the company.

Commonality is a kernel that is developed and controlled exclusively by eZ Systems. According to the informants, an implementation based on as much commonality as possible means better maintainability, higher quality and a cheaper solution.

There are two types of variability provided by eZ Systems' development framework; referred to as "supported" and "unsupported" variability by the infor-

mants. Supported variability consists of modifying HTML templates and configuration. Unsupported variability consists of interface programming, usually based on existing libraries. This variability is achieved by plug-ins into the kernel, and as the system evolves, plug-ins are extended without affecting the kernel.

Commenting on the C/V balance, the vendor's goal is to have as much configurability and as little programming as possible. The ideal is to empower non-programmers to establish complex solutions by simple configuration. A goal is to cover 95% of a customer's needs by configuration. Configuration constitutes the typical implementation effort, together with modifying HTML templates. There is hardly any programming in a typical implementation, although larger implementations are characterized by some programming.

The demarcation line between C/V is perceived by eZ Systems as an interesting design trade-off. As pointed out by one of the informants, if there is too much commonality compared to variability, the customer is being locked up due to lack of configuration options. But if there is too much variability compared to commonality, the customer will be confused due to the lack of standard functionality.

Consultancy on variability is part of eZ Systems' business model, and ranges from adapting templates for small businesses, to complex integration with legacy systems in large enterprises. Consultancy attempts to influence the customer, so that requirements can preferably be met by configurable variability.

3.3 SAP

This ERP vendor emphasizes commonality, that they provide complete solutions: "Building on the ground-breaking idea of standard enterprise software, we have become the leading provider of complete business solutions…" (SAP, 2003). In addition to a huge portfolio of software code, some commonality is represented by the so-called best business practices. These are claimed to be based on industry knowledge gained from nearly 19,000 customers in more than 20 industries (SAP, 2005).

SAP also emphasizes variability: "To deliver real value, your solutions have to be as unique as your business. That often means company-specific functionality and modifications – which can easily lead to spiralling costs. That's why we offer a range of dedicated custom-development services… This helps you get the most out of your investments in tailor-made solutions, while enhancing your competitive edge" (SAP, 2003b). One of the services of their more than 9000 SAP consultants is custom development (SAP, 2003b). There is also one example of reduced variability, the "mySAP All-in-One" solution, built to fit small customers. This is a pre-configured, industry-specific version (www.sap.com/solutions/sme/). SAP argues for its commonality by promoting best practices, and argues for its variability by promoting the services of its 9000 consultants to achieve unique customer solutions. SAP also promotes commonality and variability simultaneously: "Through extendability our customers can gain competitive advantage and have access to a cost-efficient mix of standard functionality and custom development" (SAP, 2003).

3.4 Five ECM Vendors

All the five ECM vendors studied (cf. Table 1) emphasize commonality, that they provide complete solutions. Commonality is also said to have the benefit of transforming the organization: "The true business value of Enterprise Content Management (ECM) emerges when it transforms an organization's operations to best meet the specific needs of its industry" (FileNet, 2006). Commonality is sometimes referred to as "out-of-the-box" software that allows customers to quickly create, update, manage and deploy virtually any type of electronic asset (Vignette, 2006).

All the five ECM vendors also emphasize the importance of variability, highlighting their adaptable and flexible software. Configuration, integration and consulting services are aspects of variability that are typically emphasized, and also custom code: "As with all business applications, certain business requirements may be entirely unique to a particular company or system environment. As a result, it often becomes necessary to construct custom code modules" (FileNet, 2006b). "ECM Documentum Consulting provides customers with highly customized solutions that support their unique combinations of platforms and applications… When business, process, or platform specifications dictate the extension of product or integration functionality beyond configurable capabilities, ECM Documentum consultants can apply programming expertise to … tailor the platform to the specific business case or technical environment." (Documentum, 2006).

4 Discussion

According to Markus and Tanis' (2000) enterprise system experience life cycle, the origins of misalignment issues and their resolutions may be found in previous project phases. Following the principle of contextualization (Klein and Myers, 1999), it is reasonable to consider an even larger context of the ES experience; i.e. the origins of misalignment issues in ES implementations and their resolutions may be due to vendor challenges. This paper considers two simple concepts in this larger context, the C/V balance. This is at the heart of the ES attempt to satisfy unique needs with generic software. The C/V design decision (Figure 1) highlights an important design challenge for ES vendors, and provides concepts for discussing important issues at the heart of ES design. The main findings are summarized in Table 2.

Table 2. Summary of findings: ES vendor challenges related to C/V

Issue	Description
The C/V design challenge	ES vendors build C/V mechanisms and view the C/V balance a design challenge ("a dialectic of design").
Commonality	Commonality is emphasized by all the vendors studied, and

emphasis	ES are presented as complete solutions, e.g ERP best practices.
Variability emphasis	Variability is emphasized by all the vendors studied, that ES can fit unique customer needs. To provide sufficient variability is a vendor concern, especially configurability. For the customer it is crucial that the variability is supported by the vendor. Consulting services also promote variability.
Pressure related to variability	When variability (e.g configuration) can solve a requirement, customers apply pressure on the vendor to configure rather than adapt the organization. When variability can not solve a requirement, vendors apply pressure on the customers to modify their requirements to a configurable solution ("a dialectic of adaptation").
Both commonality and variability are promoted	Vendors simultaneously promote both commonality and variability aspects of ES in their marketing ("a dialectic rhetoric").

The C/V design challenge (Table 2) is to find an optimal balance between stability and change. In the eZ Systems case this is perceived as an interesting design trade-off. Such design trade-offs are indeed manifestations of contradictions inherently related to the development of the systems, as pointed out by Dahlbom and Mathiassen (1993). This C/V design challenge is here labelled "a dialectic of design", since dialectics is about dynamics (Ven de Ven and Poole, 1995), and the C/V demarcation line is dynamic. Viewed as a response to Markus' (1997) statement on how to find ways to satisfy unique needs with generic software, the dynamic C/V balance may be appreciated as a positive and important driving force for the development of ES. eZ Systems' goal to have as much configurability as possible is an example of a quest for increased variability, and SAP's "mySAP All-in-One" is an example of a quest for reduced variability. As ES vendors have chosen to balance C/V in different ways, the synthesis will presumably have to be dynamic, with no final solution.

The commonality emphasis of complete solutions is characteristic of ES, but they are hardly ready to be installed "out-of-the-box" as e.g Vignette (2006) claims. The variability emphasis of ES as "unique solutions", raises a question for customers: what kind of variability is promoted? Is it vendor-supported table configuration or unsupported code modification (cf. Luo and Strong, 2004)? To provide sufficient variability by configuration is a vendor concern. When consultancy is promoted, is this to remedy a lack of variability, or is consultancy necessary to handle the complexity of ES variability mechanisms?

The pressure related to variability (Table 2) means that the C/V demarcation line is important for the customer too. This raises a question concerning the knowledge transfer effort from vendor to customer during implementation (Lee and Lee, 2000). If vendors focused on the C/V demarcation line in their communication with customers, would knowledge transfer to the customer improve?

Further research should explore whether an explicit focus on the C/V demarcation line would facilitate knowledge transfer to the ES customer.

Both commonality and variability are promoted simultaneously, in what may be labelled a kind of "dialectic rhetoric" (Table 2). This is also done in practice, as with Agresso's dual emphasis on complete solutions and at the same time providing a powerful customization tool. Another example is SAP, promoting best practices, and yet promoting the services of more than 9000 consultants. ES consultancy has become a lucrative business that thrives on the challenge to satisfy unique needs with generic software.

The dialectic rhetoric raises a question about the dialectic view of the C/V design (Figure 1): that for each ES property there is an "either-or" decision. This contradicts the vendor rhetoric, where the sum of properties are presented as a "both-and". Which one is true? Is C/V a dichotomy or a continuum? This is a question of perspective. Considered at a detailed level, the C/V design decision is dialectic, each individual property is either subject to change or not (Figure 1). At an aggregate level however, the total set of properties may be viewed as a continuum, due to the large number of properties. The aggregate "both-and" perspective presented by the vendors, may be problematic for customers during the chartering phase of implementation. The ES chartering phase tends to be dominated by a deterministic vision (Besson and Rowe, 2001), and understanding some vendor rhetoric as contradictory "either-or", may enable the customer to see beyond the rhetoric. Further research is needed to establish how the dialectic rhetoric is perceived by customers, and whether it contributes to the chartering phase sense of technological determinism.

5. Conclusion

Based on two simple concepts, the C/V balance focuses on a key issue when unique needs are to be satisfied with generic ES software. To consider this larger context of the ES experience has the following implications. Viewing the underlying C/V design as a dialectic "either-or", may enable ES customers to see through the vendors' "both-and" rhetoric during the chartering phase. The C/V demarcation line also affects the customer directly. If variability is unable to meet the customer's requirements, a considerable pressure is likely to be applied by the vendor or implementation partner to make the customer adapt to the system. For customers therefore, it is important to view the C/V design as dialectic and focus on the scope of variability, thus to be prepared for contradictions likely to occur in the project and shakedown phases of ES implementations.

References

Agresso (2005) Whitepaper: "Implementation the easy way". www.agresso.com.

Besson, P. and F. Rowe (2001). "ERP project dynamics and enacted dialogue". SIGMIS Database 32(4): 47-66.

Brehm, L., Heinzl, A., Markus, M.L. (2001). "Tailoring ERP Systems: A Spectrum of Choices and their Implications". Proceedings of HICSS-34, Los Alamitos CA, IEEE.

Bühne, S., K. Lauenroth, et al. (2005). "Modelling Requirements Variability across Product Lines". 13th IEEE International Conference on Requirements Engineering, Paris, France, IEEE Computer Society.

CMS Watch (2006). http://www.cmswatch.com/CMS/Report/Vendors/

Coplien, J., Hoffman, D., and Weiss, D. (1998). "Commonality and Variability in Software Engineering". IEEE Software. 15(6): p. 37-45.

Dahlbom, B. and L. Mathiassen (1993). Computers in Context: The philosophy and practice of systems design. Cambridge, Mass., NCC Blackwell.

Davenport, T. H. (1998). "Putting the Enterprise into the Enterprise System." Harvard Business Review 76(4): 122-131.

Documentum (2006). http://www.documentum.com/consulting/custom_dev.htm

FileNet (2006). http://www.filenet.com/English/Industry_Solutions/index.asp

FileNet (2006b) Consulting Services. http://www.filenet.com/English/Customer_Center/Professional_Services/Consulting_Services/Consulting_Services/012050005.pdf

http://ez.no/

Israel, J. (1979). The Language of Dialectics and the Dialectics of Language. Copenhagen, Munksgaard.

Klein, H. K. and M. D. Myers (1999). "A Set of Principles for Conducting and Evaluating Interpretive Field Studies in Information Systems." MIS Quarterly 23(1): 67-93.

Lee, Z. and J. Lee (2000). "An ERP implementation case study from a knowledge transfer perspective." Journal of Information Technology 15: 281-288.

Leishman, D.A. (1999). Solution Customization. IBM Systems Journal, 38,1: 76-97.

Liang, H. and Y. Xue (2004). "Coping with ERP-related contextual issues in SMEs: a vendor's perspective." Journal of Strategic Information Systems 13: 399-415.

Luo, W. and D. M. Strong (2004). "A framework for evaluating ERP implementation choices." IEEE Transactions on Engineering Management 51(3): 322-333.

Markus, M. L. (1997). "The Qualitative Difference in IS Research and Practice". Proceedings of the IFIP TC 8 8.2 International Conference on Information Systems and Qualitative Research, Philadelphia. 11-27.

Markus, M. L. and C. Tanis (2000). "The Enterprise System Experience - From Adoption to Success". R. W. Zmud (ed.): Framing the domains of IT management: projecting the future through the past. Ohio, Pinnaflex: 173-207.

Nordheim, S. and T. Päivärinta (2006). "Implementing Enterprise Content Management: From Evolution through Strategy to Contradictions Out-of-the-Box." European Journal of Information Systems. In press.

Patton, M. Q. (1990). Qualitative evaluation and research methods. Newbury Park, Sage.

Robey, D., J. W. Ross, et al. (2002). "Learning to Implement Enterprise Systems: An Exploratory Study of the Dialectics of Change." Journal of Management Information Systems 19(1): 17-46.

SAP (2003). "SAP Makes Innovation Happen". SAP AG Brochure Material No. 50 065 210.

SAP (2003b). "SAP Customer Services Network". SAP AG Brochure Material No. 50 045 557.

SAP (2005). "Integrated Industry-Specific Enterprise Solutions For Midsize Businesses". AG Brochure Material No. 50 061 060.

Soh, C., S. K. Sia, et al. (2003). "Misalignments in ERP Implementation: A Dialectic Perspective." International Journal of Human-Computer Interaction 16(1): 81-100.

Somers, T. M. and K. Nelson (2001). "The impact of critical success factors across the stages of enterprise resource planning implementations". Proceedings of HICSS-34, Los Alamitos CA, IEEE.

Van de Ven, A. H. and M. S. Poole (1995). "Explaining development and change in organizations." Academy of Management Review 20(3): 510-540.

Vignette (2006) http://www.vignette.com/contentmanagement/0,2097,1-1-1928-4149-1966-4676,00.html

Wei, H.-L. H., E. T. G. E. Wang, et al. (2005). "Understanding misalignment and cascading change of ERP implementation: a stage view of process analysis." European Journal of Information Systems 14(4): 324-334.

Customization of Enterprise Content Management Systems: An Exploratory Case Study

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Abstract

Enterprise Content Management (ECM) systems are mostly implemented in organizations by acquiring commercial software packages and customizing them to meet the organizational requirements. The customization aspect of ECM systems lacks empirical research. This paper explores the concepts of ECM customization and issues identified with ECM customization. The data are based on an in-depth case study from the oil industry and complemented with a secondary analysis of 60 vendor-reported cases of ECM implementations. The results show considerable customization challenges related to ECM, especially concerning integration, usability and functional adaptation. A resulting framework of customization concepts in ECM is suggested and discussed, along with issues for further research.

1. Introduction

Enterprise Content Management (ECM) is an integrated approach to managing all of an organization's information: including strategies, processes, skills, and tools [1]. ECM "integrates the management of structured, semi-structured, and unstructured information – and embedded pieces of software code – throughout the entire content life-cycle in the organizational contexts of content production and utilization" [2]. The ECM market consists of a plethora of vendors, including IBM, Microsoft, Documentum, Hummingbird and Vignette. They all provide software products with varying functionality under the concept of content management [3, 4]. In addition to the software vendors, a larger practitioner-oriented community focusing on ECM has emerged. There exists professional associations and communities, such as AIIM (www.aiim.org), a cluster of consultancy companies, and several practitioner-targeted books summing up the authors' consulting experiences [5-7]. Consulting institutions such as METAGroup, expect "the content management market" to exceed $10 billion per year in 2004 [8].

Beyond the hype facilitated by the consultancies and vendors, ECM represents a significant challenge from the viewpoint of organizations truly aiming at implementations of corporate-wide and integrated content resources. Problem areas include knowledge management, document management, web content management, and structured databases [2]. However, as noted by Munkvold et al. [2], research has so far nearly ignored the organizational viewpoint of content management, focusing on either constructive studies promoting and analyzing particular technical functionalities in software related to ECM [9-13] or purely conceptual ideas and frameworks to think about the issue in organizations [14, 15].

After the era of the "web content management pioneers" and in-house solutions of the mid-1990s [6, 16], commercial software packages nowadays play the central role in most ECM implementations. This "market-based perspective" [17] on developing information systems based on commercial software, may quite often require customization of the original products for the information processing needs of the customer organization.

The issue of software customization is at least as old as the EMACS editor [18]. More recently, it has been an issue in the field of enterprise resource planning (ERP) systems, where minimal customization has been considered a critical success factor for organizational implementations [19]. As with the ERP efforts, we have indications that customization of ECM software may involve considerable costs. For example, a market study among manufacturing enterprises Daratech [20] reports that for each $1 of expenditure on software licenses, the customization expenditure can range from an additional $1 to $10. However, a

dearth of empirical studies on customization in the field of ECM systems remains.

This paper explores the concept of customization related to ECM systems. It is based on a case study of a customer organization that has run a corporation-wide development program for 18 months. The viewpoint of this in-depth case study resides in the customization needs of ECM software anticipated by the ECM champions and IT experts of the target organization. The data are complemented by a secondary analysis of 60 case texts of ECM implementations provided by "the ECM association", AIIM (www.aiim.org).

The paper contributes by grounding the concept of customization in ECM systems and its role in the requirements definition phase of such development initiatives. After declaring the general-level working concepts of customization reviewed from the literature in the next section, section three describes an exploratory case study [21] about anticipated customization needs in a large-scale ECM initiative. Section four complements the results of that in-depth study with a secondary analysis of 60 vendor stories of ECM implementations. Section five discusses the resulting observations of the concept of customization in ECM systems and its role in the requirements definition process. Section six concludes with suggestions for further research.

2. Customization

Since definitions of customization vary, this section builds up our working definition. According to Merriam-Webster's dictionary [22], to customize generally means: "to build, fit, or alter according to individual specifications". In this context we do not mean "to build" from scratch, nor to "alter" an artefact. Rather, the concept refers to "fit" an existing software package into a customer's environment. We propose the following working definition:

Customization is a socio-technical activity of modifying the properties of packaged software, so that the resulting information system converges with the requirements of the target organization.

A number of candidate concepts to describe the customization of software exist. *Modification* and *adaptation* could be used. *Configuration* is another term that carries a more technical or architectural meaning, and we understand configuration as a subset of customization. We also regard the *integration* of software to the customer organization's existing infrastructure as a subset of customization.

We use customization in the sense of largely non-users modifying software before use. A rival concept for customization could be *tailoring*, which we have chosen to avoid here as some connotations of tailoring imply a modification of the software while it is already in use [23]. By including "socio-technical activity" in our definition, we also emphasize the interaction of the individual and the group in the process of planning for and implementing customized systems. Finally we limit our definition to packaged software, as opposed to software made-to-order.

The following options to modify software, which are here included in our concept of customization, have been identified in the tailoring literature [24]:

- Choosing between alternative anticipated behaviors
- Constructing new behaviors from existing pieces and components
- Altering the packaged software artifact

Customization does not necessarily imply total adaptation of software to organizational needs. In some cases, the target organization may need to adapt itself to software. In ERP implementations, this is a well-known phenomenon [25], referred to as "mutual adaptation" [26]. To take this phenomenon into account, our definition states that the resulting information system, as a result of customization, "converges with the requirements of the target organization". Let us next examine the concept further in relation to ECM.

3. A case of anticipated customization needs for ECM

Statoil is a Norwegian oil corporation, having approximately 16,600 employees (all potential users of ECM) in 25 countries. Statoil IT (Information Technology) employs 700 people at all major sites, and carries the central responsibility for IT services in the company. This includes the maintenance of a large portfolio of applications. The total ambition of Statoil's planned ECM-initiatives goes beyond alleviating single problems and limitations, to also provide a corporate-wide foundation for IT-supported collaborative work practices. However, this vision implies several challenges. Statoil has therefore chosen a step-wise approach comprising more than 50 preliminary development initiatives spanning a two-year period (2002-04). Since 2001, several persons in Statoil IT have focused on gaining ECM competence and scrutinizing the potential solution scenarios in relation to the enterprise's contemporary objectives and challenges. To scrutinize customization needs for ECM, Statoil thus represents an interesting case of a competent customer, unlike several companies who

need to rely on the vendors and external consultants in their requirements definition phase for ECM.

The ECM planning process in Statoil has so far consisted of the following phases:

- Strategy development (Q[uarter]1-Q2, 2002)
- Feasibility study (Q3-Q4, 2002)
- Solution scenarios (Q1, 2003)

A possible decision to purchase a commercial ECM package will lead to specification and acquisition in Q3, 2003.

This paper draws on experiences from the feasibility study, elicited by open interviews with four key project personnel – hereafter referred to as informant one, two, three, and four – after their completion of the solution scenarios. The research was conducted as an interpretive case study. The informants have been involved in the feasibility study, and each was interviewed for about 40 minutes, at the company site. Two of the interviews were conducted through telephone. The interviews were tape-recorded and transcribed. The interviews were carried out towards the end of the project planning phase in May 2003. ECM-related project documents were also analyzed. Data analysis has been following a grounded approach.

Statoil's feasibility study was based on a case which they presented to two major ECM vendors, who spent a week each providing their solutions according to the Statoil case. The vendors offered solutions based on two ECM packages characterized as "two extreme points": a comprehensive "all-in-one package" solution versus a component-based framework enabling context-specific configurations of modular ECM technology components. Statoil's customization needs anticipated by the informants are largely based on the enlightenment provided by these thoroughly scrutinized and demonstrated solution scenarios. Turning to the data, Statoil's use of different concepts related to customization are presented in the next section. Then the challenges of customization are presented.

3.1. The concept of ECM customization in Statoil

ECM in Statoil is understood as "management of content through the entire collaboration process, and through the entire life cycle of the content object". Commenting on customization needs and challenges in Statoil, informant one referred to the following strategic statement: "What is good enough for others, will be good enough for Statoil". (The quotes from the informants are translated from Norwegian to English by the authors). This implies the generic tendency to avoid extensive customization efforts, whenever possible.

Customization was related to three organizational levels in Statoil:

- Organizational level
- Group level
- Individual level

The levels were prioritized in that order, and customization was anticipated to occur in that order. Customization at the organizational level emerged as a comprehensive technical issue, group level customization was somewhat less explicitly articulated, and individual customization was barely mentioned. Hence, the current focus of customization in ECM systems in this case seemed to be on the organizational and infrastructural level, rather than focusing on group-level, let alone individually customized, ECM solutions.

'Customization' was hardly used as a concept by the informants inside Statoil. They perceived it as a commercial concept, describing the vendors' actions to develop their products according to their experience from the previous customers. Since the informants were inside the company, they used mainly the following concepts instead of customization:

- Adaptation
- Integration
- Configuration
- Migration

3.1.1. Functional customization. In general the customization of ECM functionality was referred to as *adaptation* of the package in connection to its organizational implementation, including three main areas:

- Content model management (functionality for structuring of content, metadata model, taxonomy, templates).
- Content storage and delivery management (functionality for managing user roles, access and security, versioning, transformation, classification, distribution, retention, tracking).
- Process support and automation (workflows).

The functionality customization of ECM was considered extensive: "I consider that there is a need for adaptation of most of the functions, indeed, that [the "all-in-one" solution] offers" (Informant four).

Speaking of the limits of functionality customization, informant four continued: "For example, when a vendor offers templates … or content models, we can rarely use them as-is. Usually we have to carry out that … customization ourselves then."

A few supplementary functions to the future ECM package then may be needed. However, the main objective of functional customization in Statoil

appeared to be *simplification*. A lot of functionality had been included in the two ECM packages under scrutiny, coinciding with Statoil's needs. "What often is a problem, at least in my experience with products, is that they can be functionally quite good, that is, comprehensive, rich… So what we have a need for is merely to simplify… So the purpose of adaptation to a large extent becomes simplification, simply, because these products are often too complex and functionally too comprehensive, so one has to simplify it quite drastically" (Informant four). Speaking of the existing functionality of the two packages in question, informant two said: "As I perceive such a system, it implies a fairly rigid structure, which makes it [customization] a type of simplification that most will bid welcome. In a way, that will perhaps overshadow slightly more individual characteristics." The last mention indicates that Statoil might also need to adapt to the software, instead of plainly adapting the software to Statoil. However, this approach was not mentioned by the other informants.

In addition to the simplifications due to the seemingly rigid structures of the software products, workflows customized for different user groups are expected to imply considerable costs.

3.1.2. Non-functional customization. Three non-functional aspects of customization were referred to with the concepts of integration, configuration, and migration. *Integration* is largely used in a technological sense, and integration of an ECM solution with the existing applications and infrastructure, e.g. for enabling remote offices and mobile users, is expected to be one of the major efforts ahead. In Statoil, ECM software will have to be integrated with:

- Web publication tools
- MS Office
- Collaboration suite
- Search and content classification / taxonomy tools of the future

Other architectural-level integration challenges were also mentioned, such as global network topology, enterprise portal, enterprise application integration, role based access, public key infrastructure, external access and offline access. These represent more generic challenges which an ECM solution will have to deal with. Integration is sometimes also used by informants to describe the customization of work processes, or workflow integration between applications.

Configuration was another term used for the non-functional customization of the ECM software. The focus here resides especially in the customization of user interfaces to achieve required usability. Users' positive experiences with the new system rely on skilful configurations, e.g. ECM transparency when the user is working with E-mail or MS Office connected to ECM.

Migration from old to new system for ECM can be regarded as an area tangential to customization, especially adaptation. Migration is an important activity to preserve the existing information resources. Preparation for migration can include some customization.

Table 1 summarizes the concepts related to the customization observed in the Statoil data. These concepts are partially overlapping, e.g. integration may be achieved by some adaptation of interfaces, and some adaptation may be achieved by configuration. Table 1 thus reflects tendencies in the understanding of concepts, rather than disjoint categories.

3.2. Expected customization challenges

Customization was seen as a tremendous challenge in Statoil. All customization efforts of ECM will be implemented by Statoil's internal IT service, which makes this case a bit exceptional if compared to cases

Table 1. ECM customization concepts used in Statoil

Time	Before delivery	Early preparation	Before roll-out
Level	Organization	Organization	Group
Focus	Largely technical	Technical	Business
Aspects changed	Non-functional and functional	Non-functional and functional	Functional
Concepts used	Customization	Migration (preparation) Configuration Integration Adaptation	Adaptation
Who	Vendor (and partner)	Statoil IT	Statoil IT
Expected effort	Limited	Large	Large

in which external consultants and vendors would play a major role in the organizational implementation. The major reasons for this approach reside in the cost efficiency over time and strategic competence development. An ECM solution is expected to last for many years, with an increasing functionality evolving over the years. In the long run, the in-house customizations and the competence gained to do those are considered to represent a profitable approach over time. Rather than a long term relationships with a consulting company, they want to develop the internal service provider's customization competence. This will probably be done in cooperation with selected implementation / integration partners.

The greatest uncertainty is expressed over the possibilities of *integration* with other tools and systems. "The main uncertainty is after all in relation to what we can achieve related to surrounding tools. The other tools, such as e-mail, the search and classification tools and other functional modules … uncertainty because the vendor does not deliver finished products. They supply components, but these need to be adapted, in the solution" (Informant four).

Another important aspect resides in the customization challenge of *user interfaces*. Commenting on the two candidate solutions presented during the feasibility study, informant one stated: "none of this can be presented to our users … [A] total collaboration solution should be as transparent for the user as possible, with a lot of automated processes, running in the background". Hence, a considerable configuration and adaptation effort is expected, to achieve the required usability.

In conclusion, the anticipated customization needs greatly exceed what was contemporarily offered as standard software by the vendors and implementation partners. The gap will have to be mapped by a comprehensive requirements analysis, expressed in this way by informant one: "as we now are about to begin specifying requirements for this solution, it will be a formidable task".

4. Customization issues in 60 texts of ECM implementations

To complement the study of Statoil, we conducted a secondary analysis of AIIM's 60 case descriptions of ECM solutions (www.aiim.org/all_cs.asp) in May 2003. The reason for choosing this data source was AIIM's espoused independence of any particular kind of ECM product or vendor. The cases thus represent already implemented ECM solutions for a variety of organizations from a variety of vendors.

60% (n=36) of the cases mentioned customization-related issues. Only 8% (n=5) explicitly stated that no customization was needed. The remaining 32% texts (n=19) made no reference to customization, leaving the status of customization in these cases unclear. The few cases highlighting no needs for customization concerned content management solutions for a focused, rather than an enterprise-wide scope.

Of the 60% texts describing some form of customization, the following types of customization challenges were found:

- Integration 38% (n=23)
- User interface 13% (n=8), simplification in one case
- Functionality 10% (n=6)
- Organizational adaptation to the system 7% (n=4)
- Customization of the software product conducted by the vendor according to the requirements of the customer 7% (n=4)

Looking more closely at integration, we found that in 25% of the cases mentioning integration (n=6) the vendor provided predefined solutions included in the ECM package for integrating ECM software with other packages such as application programming interfaces (APIs). In almost 50% of the integration cases (n=10) integration was provided by other software components to be purchased in addition to the core ECM package. Integration issues of ECM were mentioned e.g. in relation to ERP, database APIs, other off-the-shelf components, scanning systems, PDM (product data management), GIS (Geographical Information Systems), XML (eXtensible Markup Language) applications, portal integration, and (in-house developed) legacy systems.

User interface customization was related to issues such as customized applications, user-friendliness of front-ends, support for browsing and printing large drawings, forms processing for handheld devices, manufacturing process mimicking, and simplification of scanning solutions. Functionality customization was related to the functionality of billing systems, new applications built on the ECM core, producing ERP output through ECM, and real-time collaboration solutions connected to content management.

Although four cases mentioned organizational adaptation to the ECM system, organizational adaptation did not emerge as a big issue in general.

The major focus on integration in these cases fits well with our observations from Statoil. So does the mention of user interfaces, although Statoil appeared to emphasize usability more than what was reflected in the AIIM cases. Of course one must be careful not to jump to conclusions based on silence in these case descriptions, as there is a lot of unknown material behind them. Our observations are based on what is

explicitly stated and mentioned in the texts describing these cases.

Only four cases highlighted the vendor's capability and readiness to update the ECM software as an artifact based on the customer's needs. In the majority of the AIIM cases, the customization challenge thus rarely concerned the software package as such.

5. Discussion

Our working definition of customization appeared to fit rather well with the anticipated challenges in the Statoil ECM case. The anticipated technical activities in Statoil's case were mainly related to fitting the ECM software with the existing infrastructure, described with such subconcepts as integration, migration, and configuration. The socio-technical activities in Statoil's case were mainly related to defining and implementing work processes utilizing ECM at corporate and group levels. They were described in Statoil by the term adaptation. The adaptation of ECM requires both social and technical understanding to fit the organization and technology with each other. Hence, the customization of ECM systems highlights the socio-technical nature of the issue perhaps more than the previous literature. Especially, the ECM customization seems to highlight the issues of integration, configuration, and functional adaptation of the systems, whereas the customization of the software product as such by the vendor was not often mentioned as a significant issue. Together with the small number of organizational adaptations to ECM packages, this implies that ECM software by nature is mostly meant to provide a flexible platform for further customizing by the implementing organization.

The customization of ECM software was perceived mainly from two perspectives. Let us call them the technical/architectural and the business perspectives. From both perspectives, the main focus resides in the challenges of adaptation. In addition, integration represents another major challenge from the technical/ architectural perspective. Configuration and migration need as well to be considered from the technical viewpoint.

Figure 1 summarizes the customization issues observed from the case study data. The solid arrows describe the issues mentioned in the data which relate directly to the customization: the technically implemented ECM system might need adaptation to the needs of specific user groups and business processes (from the business perspective). The technical implementation of the ECM system may require adaptation, configuration, migration, and integration; and sometimes (although rarely) the vendor may customize the actual software artifact

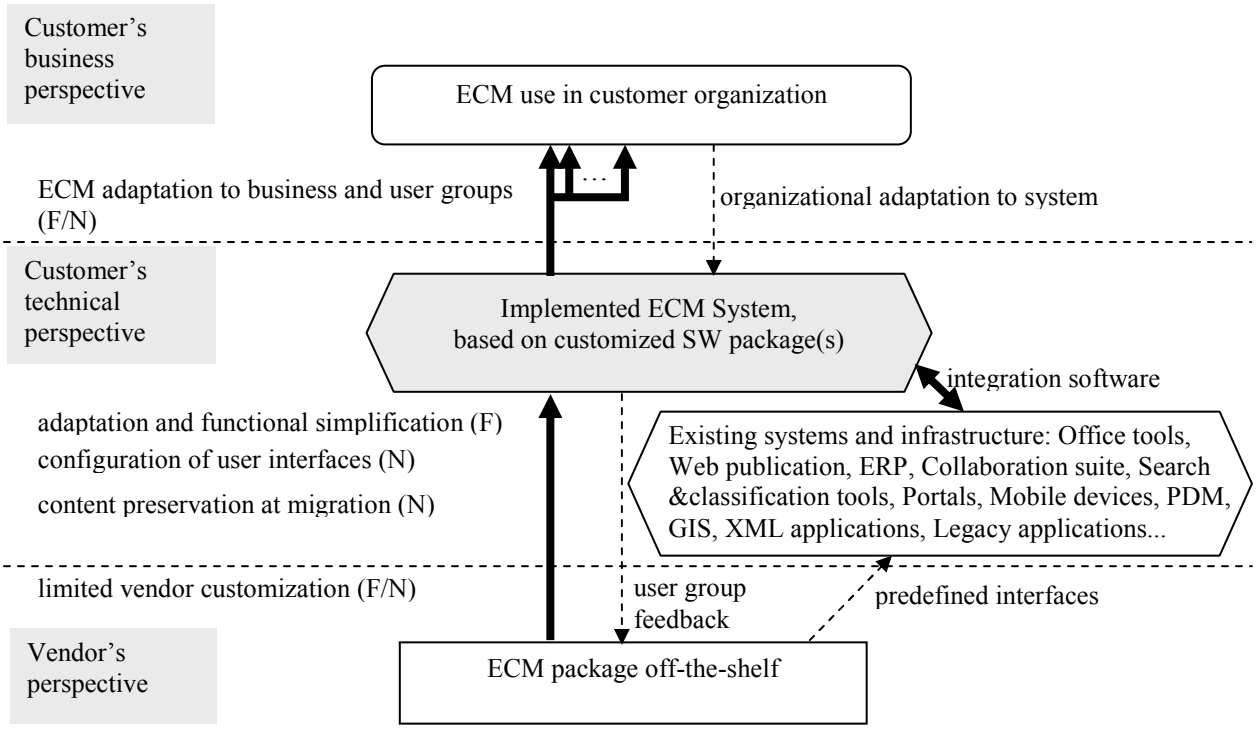

Fig 1. A framework for customization concepts related to ECM (F=Functional, N=non-functional)

based on the feedback from a particular customer. The dashed arrows describe issues which may affect the customization issues as they were mentioned in the data: the organization may still need to adapt to the existing ECM system from the business viewpoint, the pre-defined technical interfaces may significantly help the integration of the ECM software with the others, and in some cases feedback from a particular customer organization affects the product (and its further customizability) through the vendor's customization efforts.

The Statoil case, however, highlighted that the customization needs may significantly exceed the standard offers from the vendor and implementation partners. Statoil strives for filling this gap by its internal IT services, after initial collaboration with carefully selected implementation partners. In fact, this issue was seen as a central area of developing strategic competence. In this respect Statoil may be different from many companies, who would rely on implementation partners and vendors for organizational implementation.

The user interface represented an important area of non-functional customization, to accomplish integration between ECM and e-mail and search & classification tools. These issues require considerable configuration and adaptation efforts to reach the required usability. On the other hand, ECM should be maximally transparent and simplified for its users, allowing requirements for functional customization as well. A generic ECM software package may be so comprehensive that even a sophisticated customer typically needs only a subset of its functionality in a particular context. Whereas these issues were strongly highlighted in Statoil, simplification was mentioned only in one of the AIIM cases, and only 5% (n=3) of those vendor cases mentioned addition of functionality. Hence, our data highlights the need for vendor-independent research on the customization: the vendor reports seem not to highlight the challenges related to the organizational implementations of particular products after their acquisition.

At this early stage our informants in Statoil could only anticipate how customization will be performed. Following Henderson and Kyng's [24] levels of modification, we may after Statoil's feasibility study anticipate the following:

- *Choosing between alternative anticipated behaviors* will constitute the major effort in ECM. This seems to represent the main problem area of customization.
- *Constructing new behaviors from existing pieces* appears to be the main area of concern for achieving technical integration with ECM and the existing solutions.
- *Altering the artefact* by the software vendor is not an expected activity in general.

Unlike in the majority of current ERP systems, organizational adaptation to fit plainly into the capabilities provided by the software package in question did not emerge as an extremely visible issue, neither in Statoil nor in the AIIM cases. Hence, we assert that ECM and ERP systems clearly represent two different approaches to such issues as workflow and data management. ECM products provide platforms for flexible organizational implementations of content management and workflow. This includes rich possibilities to customize the organization-specific solutions for heterogeneous contexts of knowledge work and business processes with heterogeneous content. ERP products, on the other hand, rely mainly on the benchmarked and readily built-in process models for highly standardizable business processes and general solutions for their transaction processing and data management.

6. Conclusion and future research

This paper has explored the concept of customization related to ECM systems and software, resulting in a framework for the related issues. Our framework highlights a few important issues to be considered in the customers' requirements analysis processes for ECM systems.

Firstly, the Statoil case highlights the need for scrutinizing the customization issues carefully before a selection of a complex ECM product – and the need for preparing oneself for customization efforts for functionality simplification and user interface customization in this area.

Secondly, the major vendors seldom conduct the customization of ECM packages as such. ECM customization consists mainly of adaptation, configuration, integration, and migration. These efforts are typically conducted by the customer organization or their selected technical implementation consultants to fit the product onto the existing infrastructure.

Organizational implementation and cultivation of ECM may appear as a continual challenge, requiring the customer organizations to acquire such competence inside the organization instead of relying too much on external vendors and consultants in the long run. This applies especially to the more challenging and integrated ECM solution scenarios. These issues are rarely highlighted by the vendor or consulting-oriented literature, and the need for empirical and neutral research efforts on organizational implementations can

be clearly seen from our in-depth case study. If the customer organization does not possess shared in-depth knowledge of their existing business, organization and IT infrastructure, or remains unable to connect this knowledge to the opportunities offered by the ECM market, corporation-wide ECM initiatives beyond targeted niche applications can appear to be surprisingly laborious after the initial acquisition of a software package.

The major customization needs for ECM systems include:

- Non-functional integration between an ECM software and existing software tools and infrastructure.
- Non-functional configuration and simplification of user interfaces.
- Functional adaptation and simplification of the ECM package in relation to the enterprise's content model, storage management and delivery requirements, and workflows.

A longitudinal study following the actual realization of the anticipated customization issues in the Statoil case would shed additional light on challenges to the requirements analysis and organizational implementation of ECM. Such empirical research would complement the contemporary vendor and consultancy-biased literature, as well as the technical reports describing ECM software functionality as such. This could help organizations to anticipate the customization challenges for their future ECM solutions.

7. References

[1] Smith, H.A. and McKeen, J.D., *Developments in Practice VIII: Enterprise content management.* Communications of AIS, 2003. **11**(33): p. 1-26.

[2] Munkvold, B.E., Päivärinta, T., Hodne, A.K., and Stangeland, E. *Contemporary Issues of Enterprise Content Management: The Case of Statoil*. in *Proceedings of the 11th European Conference of Information Systems (ECIS 2003)*. 2003. Naples, Italy.

[3] Clyman, J., *Content Management Systems at a Glance*, in *PC Magazine*. 2002.

[4] Doculabs, *Special Report on Content Management Products*. 2000, Doculabs: Chicago, IL.

[5] Asprey, L. and Middleton, M., *Integrative Document and Content Management: Strategies for Exploiting Enterprise Knowledge*. 2003, Hershey: Idea Group.

[6] Boiko, B., *Content Management Bible*. 2002, New York: Hungry Minds.

[7] Nakano, R., *Web Content Management: A Collaborative Approach*. 2002, Boston: Addison-Wesley.

[8] METAGroup, *Web Content Management Market to Reach $10 Billion by 2004, Says META Group*. 2002.

[9] Balasubramanian, V. and Bashian, A., *Document management and Web technologies: Alice marries the Mad Hatter.* Communications of the ACM, 1998. **41**(7): p. 107-115.

[10] Kerer, C., Kirda, E., and Kurmanowytsch, R., *A generic content-management tool for Web databases.* IEEE Internet Computing, 2002. **6**(4): p. 38-42.

[11] Mack, R., Ravin, Y., and Byrd, R.J., *Knowledge portals and the emerging digital knowledge workplace.* IBM Systems Journal, 2001. **40**(4): p. 925-955.

[12] Rein, G.L., McCue, D.L., and Slein, J.A., *A Case for Document Management Functions on the Web.* Communications of the ACM, 1997. **40**(9): p. 81-89.

[13] Surjanto, B., Ritter, N., and Loeser, H., *XML content management based on object-relational database technology*, in *Proceedings of the First International Conference on Web Information Systems Engineering*. 2000, IEEE: Los Alamitos. p. 70-79.

[14] Goodwin, S. and Vigden, R., *Content, content everywhere... time to stop and think? The process of web content management.* Computing & Control Engineering Journal, 2002. **13**(3): p. 66-70.

[15] Han, X. and Pape, U. *The Integration of Content Management System and Workflow Management System - A Conceptual Model*. in *Proceedings of International Conference on e-Business (ICEB 2002)*. 2002. Beijing.

[16] Lau, T., *Revamping a Corporate Web Site: Strategies and Implementation*, in *Proceedings of the International Professional Communication Conference (IPCC'96)*. 1996, IEEE: Los Alamitos.

[17] Sawyer, S., *A Market-based Perspective on Information Systems Development.* Communications of the ACM, 2001. **44**(11): p. 97-102.

[18] Stallman, R., *EMACS: The Extensible, Customizable, Self-Documenting Display Editor*, in *Proceedings of ACM SIGPLAN SIGOA*. 1981, Massachusetts Institute of Technology. p. 301-323.

[19] Somers, T.M. and Nelson, K. *The impact of critical success factors across the stages of enterprise resource planning implementations*. in *Proceedings of the 34th Hawaii International Conference on Systems Sciences (HICSS-34), January 3-6, Maui, Hawaii*. 2001. Los Alamitos CA: IEEE.

[20] Daratech, *The Changing Role of IT in Manufacturing: Document/Content Management vs PDM - How Buyers Choose*. 2001, Daratech.com.

[21] Yin, R.K., *Case Study Research - Design and Methods*. 2nd ed. 1989, Newbury Park: Sage.

[22] *Merriam-Webster's collegiate dictionary*. 10th ed. 1996: Merriam-Webster, Springfield.
[23] Kahler, H., *Supporting Collaborative Tailoring*. 2001, Roskilde University: Roskilde.
[24] Henderson, A. and Kyng, M., *There's No Place Like Home: Continuing Design in Use*, in *Design at Work - Cooperative Design of Computer Systems*, J., G. and M., K., Editors. 1991, Lawrence Erlbaum, Hillsdale NJ. p. 219-240.
[25] Davenport, T.H., *Putting the Enterprise into the Enteprise System.* Harvard Business Review, 1998. **76**(4): p. 122-131.
[26] Soffer, P., *Aligning an Enterprise System With Enterprise Requirements: An Iterative Process*, in *Proceedings of the Fifth International Conference on Enterprise Information Systems (ICEIS), April 23-26, Angers, France*. 2003. p. 147-155.

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Implementing enterprise content management: from evolution through strategy to contradictions out-of-the-box

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Abstract
This study examines a strategic development and implementation process of enterprise content management (ECM) in a large oil company. In view of the framework of four motors of development and change in organizations, this study represents a revelatory case of a hybrid development approach to ECM that involves the teleological, life-cycle, and dialectical motors of development. This is in contrast to the evolutionary development motor, which has prevailed in the hitherto reported content management research. The case study also complements process-based research on enterprise system implementations in general. We suggest that research and practice on large-scale ECM implementations should acknowledge all the four motors of change.
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Keywords: enterprise systems; enterprise content management (ECM); system implementation; process-based research; teleology; life-cycle; dialectics

Introduction

Enterprise Content Management (ECM) is an emerging field in information systems which involves 'the strategies, tools, processes, and skills an organization needs to manage its information assets over their life-cycle including all digital assets that may be considered information content, such as documents, data, forms, reports, and web pages' (Smith & McKeen, 2003). Whereas a major part of content management research has been conceptual or constructive, introducing new ideas and products (Munkvold *et al.*, 2003), a dearth of research on implementations of content management systems in organizations has been noted (Smith & McKeen, 2003; Päivärinta & Munkvold, 2005). It is only recently that organizations seeing the strategic significance of content management have begun with their enterprise-level development programs (Munkvold *et al.*, 2003; Smith & McKeen, 2003).

To fill this gap in ECM research, we thus focus on the question:

What issues emerge during the process of developing strategic, enterprise-wide content management systems?

We conducted a longitudinal study of an ECM development program in Statoil, a Norwegian oil company. The rare academic reports on content management implementations in organizations (Weitzman *et al.*, 2002; Scott *et al.*, 2004) have mainly assumed or described evolutionary and emergent application development and integration (Smith & McKeen, 2003). In contrast, the Statoil case represents a revelatory case of a strategic

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and enterprise-wide approach to the implementation of content management technology. In addition to comparing the case to the field of ECM, we also discuss the case in view of the literature of other enterprise systems, especially enterprise resource planning (ERP).

The rest of the article is organized as follows: Section 'theoretical background' presents the concept of ECM, the theoretical background of four motors of organizational development (Van de Ven & Poole, 1995), and five analytical patterns built upon these four motors. After a description of our research method in Section 'research methodology', Section 'implementing ECM in statoil: background and case description' describes the case study – an ECM development process and implementation in Statoil in 2002–2005. The discussion section discusses the findings of this study in view of the theoretical background, with implications for enterprise systems research and practice. Finally, the last section outlines suggestions for future research.

Theoretical background

Enterprise content management

In information systems practice, enterprise content management (ECM) has gained ground since the 1990s (Munkvold *et al.*, 2003). The ECM market, though immature, continues to grow, involving a plethora of content management software vendors (CMS Watch, 2005). A great number of consulting businesses provide services for helping clients select, integrate and implement software solutions. With regard to information systems research, however, the field of ECM is still in its infancy (Smith & McKeen, 2003).

Päivärinta & Munkvold (2005) trace the predecessors of the ECM field to traditional information systems concepts such as information resource management (IRM), electronic document management (EDM), and knowledge management. ECM represents a modern concept of IRM in general, addressing the integration of semi- and unstructured data with the management of formal databases, which has dominated the focus of the IRM field (ibid). EDM has traditionally addressed the management of files (Sprague, 1995). The idea of content management, especially with (semi-)structured XML content, goes beyond the idea of a file as an object to be technically managed, bringing in new technical and organizational challenges to keep track of content together with its organizational production and use, in all of its imaginable technical forms (Päivärinta & Munkvold, 2005). In ECM solutions, especially those to be accessed through portals (Mack *et al.*, 2001), system designers combine information resources from multiple sources and applications and build navigational aids to cover the information resources of the organization and beyond.

The concept of knowledge management (KM) is closely related to ECM. ECM can be regarded as a sub-field of KM (cf. Scott *et al.*, 2004), covering the so-called repository model of KM (Alavi, 2000; Alavi & Leidner, 2001). That is, whenever knowledge is transformed from tacit to explicit (Nonaka, 1991), content processing and management in one form or another is needed. However, the idea of content refers not necessarily to 'serious knowledge' only. For example, various forms of multimedia content can be important for an entertainment company to be managed as the very product of the business. Päivärinta & Munkvold (2005) conclude that ECM represents an integrated perspective on information management in enterprises, involving the following characteristics, which together characterize the ECM concept:

- cohesive management of content life-cycles with integrated solutions for content production, capture, storage, version management, distribution, publishing, retrieval, and retention
- logically integrated content models, including understanding of content structures for production and use, metadata, and corporate taxonomies for content retrieval regardless of the format
- user and enterprise models that guide content production and utilization in context (e.g., for personalization, user and access rights management, and workflow)
- technologically integrated infrastructures or platforms, which make enterprise-wide search, access, and re-use of content possible, irrespective of the technology by which a particular piece of content is initially produced
- administrative procedures continuously maintaining, cultivating, and, when necessary, transforming the technological platforms, content bases and models, user bases and models, and workflows, which make the above issues possible (cf. Päivärinta & Munkvold, 2005).

All in all, the concept of ECM addresses the enterprise-wide viewpoint in contrast to the hitherto widespread application-oriented viewpoint to content management systems (Smith & McKeen, 2003).

Development and change processes in content management and enterprise systems

The scarce ECM literature led us to look at the enterprise systems (ES) literature in general as a conceptual basis for our research. Markus & Tanis (2000) argue that an *enterprise system:*

- integrates a significant proportion of information created and used in an organization,
- is based on commercial software packages,
- can involve implementation of best practices concerning organizational processes,
- requires some assembly (e.g., software integration) to be usable, and
- can evolve architecturally over time (e.g., from client-server architecture to web-based architecture).

In addition to ERP systems, which have been highlighted in the ES literature, other types of ES that fulfil these characteristics can be identified, such as enterprise application integration platforms (Lee *et al.*, 2003),

customer relationship management systems, data warehouses, and, as discussed below, ECM systems.

To understand the implementation processes of enterprise systems, we turned to Van de Ven and Poole's (1995) review on the literature of organizational development and change. They (ibid) summarize the literature under four metatheoretical motors of development and change: the teleological motor, the evolutionary motor, the life-cycle motor, and the dialectical motor.

The *teleological motor* views change as the result of purposeful cooperation, including goal formation, implementation, evaluation, and modification. Change focuses first on rational observation of problems. Then goals for change are set to respond to the observed issues, and development initiatives relevant to the goals are taken. The success or failure of results can then be assessed according to the goals.

The *evolutionary motor* views change as the result of cumulative changes due to competition for scarce resources. It focuses on repetitive processes of variation, selection and retention among organizational entities. Change at the level of the organization progresses due to actions launched in order to respond to the needs of smaller-scale entities within the organization, which then altogether change the organizational 'ecology' over time.

The *life-cycle motor* views change as the result of a prefigured organizational program that prescribes a sequence of phases. Each phase contributes to the final product, and must occur in a prescribed order. Typically, different phases of a life-cycle model have different characteristics, which explain issues of change and development. Any organizational change such as the implementation of an information system involves a window in time, a life-cycle, during which systems are to be developed, used, and finally terminated. Various organizational programs of change have life-cycles of their own, which may be more or less synchronized with the life-cycles of the others.

The *dialectical motor* views change as the result of contradictory values competing for domination. Explicit thinking in terms of contradictions constitutes the key element of this view (Mathiassen & Nielsen, 1989). A contradiction exists between two opposite aspects, thesis and antithesis. A thesis may be challenged by an antithesis, and the resolution of the contradiction becomes a synthesis. Such a synthesis can be a novel construction departing from both the thesis and the antithesis (Van de Ven & Poole, 1995). This synthesis, in turn, becomes a new thesis as the dialectical process continues. However, a contradiction does not necessarily result in a *new* synthesis with a novel idea (ibid). An observed contradiction may continue in the organization, maintaining the pluralist or conflicting status quo, or it may result in survival of the thesis or antithesis alone.

The teleological motor of change is prominent in the ERP research as the mainstream literature suggests ERP systems to be developed and evaluated based on the strategic objectives of the organization (Lee & Myers, 2004). In the field of ECM, the practitioners (e.g., Jenkins, 2005) approach the development of a content management application from the teleological viewpoint as well. A typical 'vendor case' lists the goals, strategic or operational, of a content management implementation and then shows how these goals are met, often with such measurement tools as 'return of investment' (ROI) or 'total cost of ownership' identified with the particular application in question. The critics of this view address that plain focus on goals regards an ERP implementation process as a 'black box' and ignores the fact that the strategies and goals may change on the way (Robey *et al*., 2002; Lee & Myers, 2004).

The evolutionary motor is less prominent, mainly mentioned to describe development of ERP software by vendors (Kumar & Van Hillegersberg, 2000). Interestingly, Scott *et al*., (2004) describe an evolutionary development and integration process targeting three initially separate content management systems in JD Edwards. Based on their longitudinal analysis, drawing on a previously suggested evolutionary framework for an intranet implementation process (Damsgaard & Scheepers, 2000), Scott *et al*. (2004) suggest 'four stages of content management evolution': initiation, contagion, control, and integration; with 12 lessons learned for the future developers of content management (Table 1).

The lessons learned to 'manage' evolution (Table 1) reveal that the JD Edwards case (ibid) actually incorporates a few teleological elements into their four-stage framework of evolution. Scott *et al*. (2004) also describe ROI figures for two of the content management applications, indicating evaluation within a given set of goals. In any case, the study describes how three initially separately focused content management applications evolved towards an integrated content management platform in the organization. In light of Van de Ven and Poole's (1995) four motors, we can regard JD Edwards case (Scott *et al*., 2004) as a hybrid of evolutionary and teleological viewpoints. As it to our knowledge represents the first longitudinally reported ECM case in the IS literature, it also forms a useful benchmark for discussion.

From the perspective of the life-cycle motor, an enterprise system implementation comprises a sequence of iterative stages (Markus & Tanis, 2000). The *enterprise system experience cycle* model (ibid) provides a life-cycle-oriented model for conceptualizing ES implementation projects. Key activities of the *chartering* phase include building a business case, identifying a project manager, and adopting a budget and schedule. Selecting integration solution and vendor(s) may also be part of this phase, or it may be deferred until the project phase. Key activities of the *project* phase include current and/or future business modelling, software configuration, system integration, testing, data conversion, training, roll-out and start-up. Key activities of the *shakedown* phase include bug-fixing and rework, system performance

Table 1 The four stages of content management evolution by Scott *et al*. (2004)

		Lessons learned from JD Edwards
Initiation	1	Gain executive support (champion or evangelist to sponsor development of particular applications)
	2	Reuse content (single-source principle for technical documentation, i.e., store once, use for multiple purposes)
Contagion	3	Establish content ownership early
	4	Align each technical initiative to revenue-generating business processes
	5	Establish and leverage standards for metadata, document templates, interaction design and navigation taxonomy
Control	6	Persevere to keep resources available, on-going sponsorship
	7	Replace outgrown technology
	8	Replace outgrown governance
Integration	9	Develop and operationalize an enterprise vision
	10	Transfer expertise and experience across CM projects
	11	Replace static metadata with dynamic metadata
	12	Certify authors and formalize job descriptions

tuning, process and procedural changes, retraining, and staffing up to handle temporary inefficiencies. The *onward and upward* phase focuses on achieving results, maintaining the system, supporting the users, upgrading technology, and maintaining an innovative attitude for the future. Within these four phases, the implementation of an ES can be regarded as an on-going process of organizational learning and change (ibid). For example, Wei *et al*. (2005) use the Markus and Tanis framework to illustrate how different change drivers tend to dominate misalignment resolution in the phases of the ERP life cycle.

A rather limited body of literature adopts the dialectical motor to explain the process of ERP implementation (Besson & Rowe, 2001; Robey *et al*., 2002; Soh *et al*., 2003). A substantial body of IS development literature outside the field of enterprise systems has also utilized the dialectic perspective, suggesting varying contradictions observed in IS development projects (Bjerknes, 1992; Ehn, 1988; Mathiassen & Nielsen, 1989; Sabherwal & Newman, 2003). However, traditional in-house system development differs from the 'consumer system development life-cycles' within 'market-based' systems development since mostly commercial software packages and components are utilized in the latter approach (Sawyer, 2001). Hence, we will examine two dialectics identified with the ES implementations: dialectic of adaptation and dialectic of learning.

A *dialectic of adaptation* emerges between the features of an ERP package versus the organization-specific requirements addressed by an organization adapting the package (Soh *et al*., 2003). The level of adaptation may vary from full customization (or technology adaptation) to 'out-of-the-box' implementation and maintenance. The latter often requires organizational adaptation to technology (Davenport, 1998). Unless the mode of adaptation is enacted by users, contradictions may continue in the form of 'workarounds' and avoidance of the implemented system by users. Moreover, the organizational environment and strategies may change during long ERP implementation processes (Lee & Myers, 2004) and may, in the worst case, lead to a situation in which a rigid technology implementation even 'betrays' the dynamic needs of the organization (Hanseth & Braa, 1998).

A *dialectic of learning* (Robey *et al*., 2002) in ERP development 'occurs between, on the one hand, the old knowledge embedded in business processes and practices associated with legacy systems and, on the other hand, the new business processes and practices that ERP is designed to support' (p. 37). To learn to utilize ERP, a company needs to overcome two types of knowledge barriers: (i) configuration of the ERP package, and (ii) assimilation of new work processes. Thus, ERP systems typically require organizations to forget large portions of what they already know about their existing technical infrastructures and business processes (ibid). The synthesis of this contradiction often results in a learning process and in alternative strategies for implementation (ibid).

Besson & Rowe (2001) combine three of the four abovementioned theoretical lenses to analyse ERP development projects. They use the ES life-cycle model (Markus & Tanis, 2000) as a framework to organize their observations. Furthermore, they argue that during the *chartering* phase a deterministic vision dominates the perceptions of decision-makers based on a few general-level strategic statements, without considering much the design of governance, work structures or the actual change strategy or socio-technical risks involved. During the *project* phase, the designers and external consultants come closer to the organizational imperative view when they customize the system and make integration/differentiation choices. Unlike the chartering phase that focuses on general-level issues, the project phase involves numerous detailed technical choices within a very limited time. During and after the *shakedown*, targeted organizational outcomes are often not realized because of job and governance conflicts among the users and other stakeholders. Now specific stakeholders may encounter changes in their work and find that they possess redundant information or processes whose governance needs to be decided. Hence, the dialectical view often

dominates the shakedown phase, even if the change process was assumingly teleological in the chartering and project phases (Table 2).

To summarize our theoretical review, we identified five patterns of development with the previous ECM and ES literature:

1. The 'mainstream' teleological pattern focusing on problems, goals, features of implementations, and success or failure factors of an ERP implementation.
2. The hybrid pattern addressing bottom-up evolution and, to some extent teleological, change management of content management until system integration (initiation, contagion, control, integration).
3. The life-cycle pattern with the chartering, project, shakedown, and onward and upward phases.
4. The dialectical pattern of an ERP implementation with two sub-patterns
   (1) Dialectic of adaptation.
   (2) Dialectic of learning.
5. The hybrid pattern of an ERP implementation, framing the whole as a life cycle, within which a teleological (deterministic) pattern of development applies to the chartering and project phases, whereas dialectics (focusing on user adoption of the system) emerge during the shakedown phase.

We will use these patterns as the theoretical basis to discuss the contribution of our case study (Yin, 1989) to the existing literature.

Research methodology

In 2002, Statoil launched a corporate-wide ECM program, which targets at a 'knowledge reservoir' that 'provides global access to and the management of a common pool of digital assets used to collaborate, support work processes and share information between the company and their customers, employees and business partners' (December 2002). A group of researchers has been able to follow the development from the start and reported from the early phases of the program, focusing for example, on the issues leading to such a program (Munkvold *et al.*, 2003) and customization requirements for ECM software (Nordheim & Päivärinta, 2004).

Table 2 Changes in development viewpoints during ES life cycle (Besson & Rowe, 2001)

	Chartering phase	*Project phase*	*Shakedown phase*
Point of view	Deterministic	Engineering/rational actor	Dialectic
Focus	A few big issues, the whole	Many small issues, technical details	Resolving job and governance conflicts, normalizing operations
Stakeholders involved	Few, mainly management	System developers, some new stakeholders	Lots of new stakeholders

Table 3 Data sources

Date	*Type of data*	*Remarks*
03.2002	CM in Statoil, project presentation by key project member	Slides
06.2002	In-depth study of ECM issues during the strategy process, including 8 interviews of key stakeholders	In Munkvold *et al.* (2003), report
08.2002	eCollaboration strategy, report	Paper
09.2002	Project handbook, feasibility study	Paper
12.2002	Feasibility study: steering group presentation	Slides, on paper
01.2003	Project handbook, solution scenarios	Paper
02.2003	Corporate taxonomy and ECM, presentation by ECM discipline advisor	Slides, on paper
05.2003a	Recommended solution, preliminary version by key project member	Slides, on paper
05.2003	Interviews with four key project members (ECM, ICT), solution scenarios	Transcribed
10.2003	Request for proposal, RFP 2003/00683	Electronic version
03.2004a	eCollaboration key issues, review of report	Slides, on paper
03.2004	'Out-of-the-box' implementation of Statoil's new collaboration and information management solution: issues	Internal Report
06.2004	Collaboration@Statoil functional and non-functional specification	Electronic version
08.2004	Custom components design specification v1.0	Electronic version
10.2004a	Project presentation, Collaboration@Statoil, by ECM discipline advisor	Slides, electronic
10.2004	Project presentation, lecture by ECM discipline advisor	Transcribed
02.2005	Two interviews with a key project coordinator concerning the implementation and pilot phases	Transcribed
05.2005	Project handbook version 2	Paper
06.2005	Interviews with 2 key project members (ICT)	Transcribed
10.2005	Project presentation, Collaboration@Statoil	Memo and slides

Table 3 summarizes our data sources throughout the first six phases of the project. In the text, we refer to particular sources by date. We had access to project documents and the key project staff. The project was organized after a project model with a sponsor, steering group, project group, quality assurance group, and a reference group with representatives from the business units. The data reflect mainly the project group viewpoints, and in particular the ECM domain, although one key informant also participated in the steering group, the quality assurance group and the reference group.

The research effort continued in 2004 and in 2005 with a focus on studying the dialectical motor of change through interviews, in addition to collecting available project documentation that seemed mostly to support the teleological and life-cycle-based views on development. Dialectics was used as a 'sensitizing concept' (Patton, 1990) to guide further data collection and analysis. All interviews were audio-taped and transcribed. More than 700 pages of documents, including the research interviews and project documents, were gathered.

The study has been guided by Pettigrew's (1990) advice on longitudinal research on change, especially exploring the larger context and paying attention to the 'often contradictory ways that change emerges'. Following Robey & Boudreau (1999), the opposing forces at play were identified through process research. Multiple interpretations of the data were sought, applying multiple theoretical patterns in the analysis as described above. An analysis based on dialectic forces was an *a priori* choice (Robey *et al*, 2002) in the latter part of the study. The initial findings were probed as open questions in subsequent interviews, and at a later stage the development motors identified, especially the dialectical motor, were verified with key project members. The final interpretations were also confirmed with two of the key ECM experts in Statoil. The iterative data collection and analysis process allowed for observation and verification (Pettigrew, 1990).

Implementing ECM in statoil: background and case description

Statoil is the third largest exporter of crude oil in the world, with approximately 24,000 employees in 29 countries in 2005. With a turnover of 37,000 million Euro in 2004, the company operates 60% of all Norwegian oil and gas production. To illustrate the information management challenges, Statoil's volume of information objects grew at a rate of about 300,000 per month in 2005. Legislation, such as the Sarbanes-Oxley Act of 2002, emphasizes the need for ECM so that the organization can comply with the legislative requirements.

Statoil was one of the world's largest users of Lotus Notes/Domino in the 1990s (Monteiro & Hepsø, 2000; Munkvold & Tvedte, 2003). Otherwise, typical of many decentralized corporations, Statoil's IT architecture evolved into a portfolio of technologies with partly overlapping functionality and applications. As a result, the company's information infrastructure scattered over a number of different storage media and applications. This created major challenges related to information retrieval, version control and information quality across the enterprise (Munkvold *et al.*, 2003).

Owing to the history of distributed evolution of the previous information infrastructure on the Notes platform and beyond, the project recognized a number of content management challenges in 2002. These challenges were of such a nature and scope that the term content management 'pains' was used (May 2003a). The challenges included important information stored in private folders, and multiple copies in ca. 5500 unsynchronized Notes repositories. Methods-related challenges included poor content quality assessment, information anarchy and overflow, difficult information search, and policies based on non-digital archives. Organizational challenges included lack of management attention and commitment, lack of incentives, and unclear governance roles and responsibilities. Service-related challenges included lack of policies and best practices for collaboration and digital content management with insufficient training. Tool-related challenges included lack of simplicity as the users faced too many choices and possibilities, poor content search and retrieval functions, poor content management functions, and poor integration of tools and functions.

In response, Statoil's corporate IS/IT service launched a major ECM development program:

1. To establish a best practice for collaboration and information sharing across organizational and geographical boundaries.
2. To establish information traceability as well as easy, correct and secure access to information throughout the information life cycle, including provision for legal requirements.
3. To improve search and retrieval functions to ensure information sharing and reuse.
4. To limit duplication of data by introducing team sites where all relevant information for a project or management team is accessible. (August 2002).

The ECM program implies that content from external and internal information suppliers should be managed regardless of application used for creating information, and that all types of content should be handled regardless of format. The Statoil ECM initiative thus represents a comprehensive development program for the enterprise. Tool investments alone were estimated to reach 7–8 million Euro when launched in 2002. 'The [ECM] project has become as important as our SAP [ERP] project was at the end of the 1990s' *(Discipline advisor in ECM, February 2005)*.

Statoil turned to commercial vendors of ECM platforms. The project sponsor expected a solution mostly based on off-the-shelf software with minimal reconfiguration and limited use of custom components: 'What is good enough for others is good enough for Statoil' (March 2002).

Such 'out-of-the-box' approach is a tradition in Statoil, which has traditionally implied some adaptation of work processes to fit with the software, especially with the previous ERP (SAP) implementation in the end of the 1990s.

Statoil's business units were represented in the project reference group, to achieve project involvement and ownership. The project followed an in-house methodology (ProMIT), with four main phases: pre-study, concept specification, execution and conclusion. This study covers the pre-study, concept specification, and the first parts of execution. These were divided further into seven more detailed phases (Strategy, Feasibility study, Solution Scenarios, Request for information, Request for proposal, Design specification, and Pilot implementation). To understand the process of ECM development and implementation, which led to corporate the solution sketched above, we present the seven project phases (Figure 1) in more detail.

Phase 1 The strategy phase between January and August 2002 provided vision and direction within the time frame 2002–2004. The strategy set eight strategic goals for enabling efficient collaboration and information sharing. The goals were labelled ability, openness, synergy, quality, security, simplicity, accessibility and flexibility. In this phase, the project was conceptualized rather teleologically: a group of goals corresponding to observed problems or challenges were organized in the strategic development program. The adoption of the in-house ProMIT methodology, in turn, represents a life-cycle oriented approach to change. However, the strategy document already contained a latent contradiction between the above-mentioned corporate policy using commercial software 'off-the-shelf' and project vision statements on simplicity and flexibility, which address the end user's experience. For example, the goal of simplicity from the user viewpoint was defined as: ' …tools are easily understood, accepted and adopted by most users. Main functions are intuitive enough to eliminate the need for training, and easily adopted by different user types and collaboration environments.' (August 2002). The sponsor also expressed his initial emphasis on the end user experience, crystallized in the slogan '*I'm loving IT*' (October 2004).

Another contradiction to the 'out-of-the-box' thesis was expressed by the sponsor's expectation of '*zero data migration*', later realized as a requirement that old and new systems need to co-exist, with old and new content accessible without any content conversion. We regard this contradiction as latent in this phase, because no one had the necessary overview to detect the dialectic. To comprehend the contradiction between the stated goals, a deep understanding of both Statoil's needs and the properties of ECM software would have been needed.

Phase 2 The feasibility study from August to December 2002 evaluated whether the proposed goals could be accomplished. It was framed according to four issues: effect goals, object goals, process goals and the deliveries to meet the goals. Phase 2 included product demonstrations and architectural workshops in cooperation with vendors, literature studies, and strategy workshops with participants from different Statoil business units. Two ECM vendors were selected to present a 'business case' of ECM. The vendors had to demonstrate the feasibility of their solutions by solving the given case while observed by Statoil's project personnel who learned about the constraints and opportunities of the software packages in question.

The two evaluated software packages raised a number of concerns. These were presented to the steering group as '*concerns*', '*weaknesses*' and '*uncertainties*' to describe how commercially available software could meet Statoil's needs and thereby realize the eight strategic goals (December 2002). In this phase, the dominating motor for change seemed to be teleological: the goals were crystallized, the possibilities for solutions studied, and lessons learned by the project group were scrutinized with regard to the goals.

Phase 3 The study of alternative solution scenarios between February and May 2003 focused on architecture, content model and best practices to achieve the strategic goals. The ECM content model included a first version of the metadata model, taxonomy and templates to facilitate content production and search. Eight solution scenarios were analysed and developed, describing methods, tools, services, organizational means and deployment principles. A thoroughly scrutinized solution

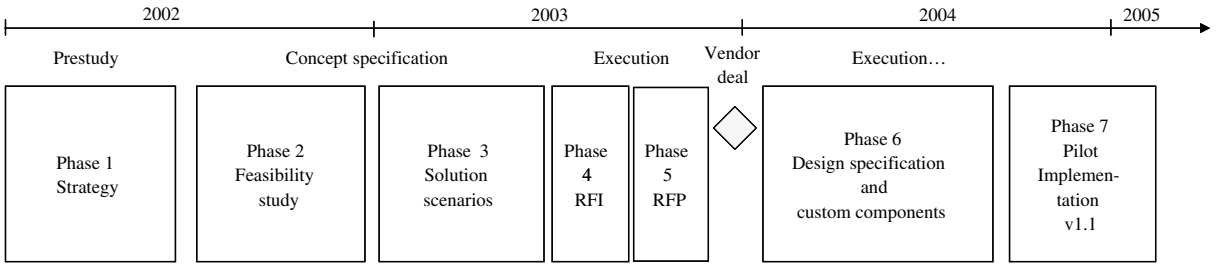

Figure 1 Overview of Statoil's ECM program.

concept and architecture was then presented, with an analysis of consequences and costs. The results were used as background material for budget planning for 2004–2006, and for the corporate process of choosing and approving the concept and implementation project in June–August 2003.

The first three phases lasted 1.5 years altogether, representing an extensive competence-building effort, which was a combination of teleological rationality organized under the life-cycle-based project model. Competence-building produced knowledge of new e-collaboration and ECM technologies and new insights into the organization itself. The first phases involved problem identification and solution inputs from large groups of business representatives, though the project group dominated the process together with corporate ICT services and senior management.

With the feasibility study, the volume of knowledge increased to the extent that awareness of possible contradictions between the 'out-of-the-box' ideal versus the goals for user experience and integration is reflected in the form of identified challenges in phases 2 and 3. There are no indications that the thesis of 'out-of-the-box' implementation was explicitly challenged, but the identified concerns, uncertainties and challenges increased awareness and tension between the idea of 'out-of-the-box' implementation and the goals for usability and solution integration.

Phases 4–5 The request for information process (RFI) July–September 2003 narrowed down the candidate vendors to three. Recommendations and conclusions from this work led up to the start-up of the implementation project. The request for proposals (RFP) process took place between October and December 2003. The importance of following the IT governance strategy was reiterated in the introduction to the RFP: 'The main focus will be on implementing best practice for collaborative processes and the expectation is that standard 'off the shelf' system solutions will have the required functionality. It is important for us to have solutions based on standard technology, as we do not want to be the one and only user of any [commercial] software.' (October 2003). At the same time, the strategic goal of simplicity was emphasized in the RFP introduction: 'The primary success criteria and evaluation criteria for Statoil will focus on total end-user experience and acceptance, more than on specific functionality in specific components.' (October 2003). Hence, the inherent contradiction between these strategic goals became more explicit.

The RFP document defined architectural and functional requirements for collaboration, web publishing, search, classification and ECM functionality. The RFP consisted of 83 functional and 45 architectural requirements. The 83 functional requirements were categorized into collaboration (16), web publishing (4), search and classification (20) and ECM (43) requirements. Examples of ECM requirements included: management of corporate taxonomy; access synchronization by content check-out/in; on-demand version comparison of information objects; audit utilities to provide a complete account of object receipt, retrieval, and preservation activities. Architectural requirements were related to Statoil's infrastructure as illustrated in Figure 2. Examples of the requirements include transparent integration of ECM functionality within other portal and standalone

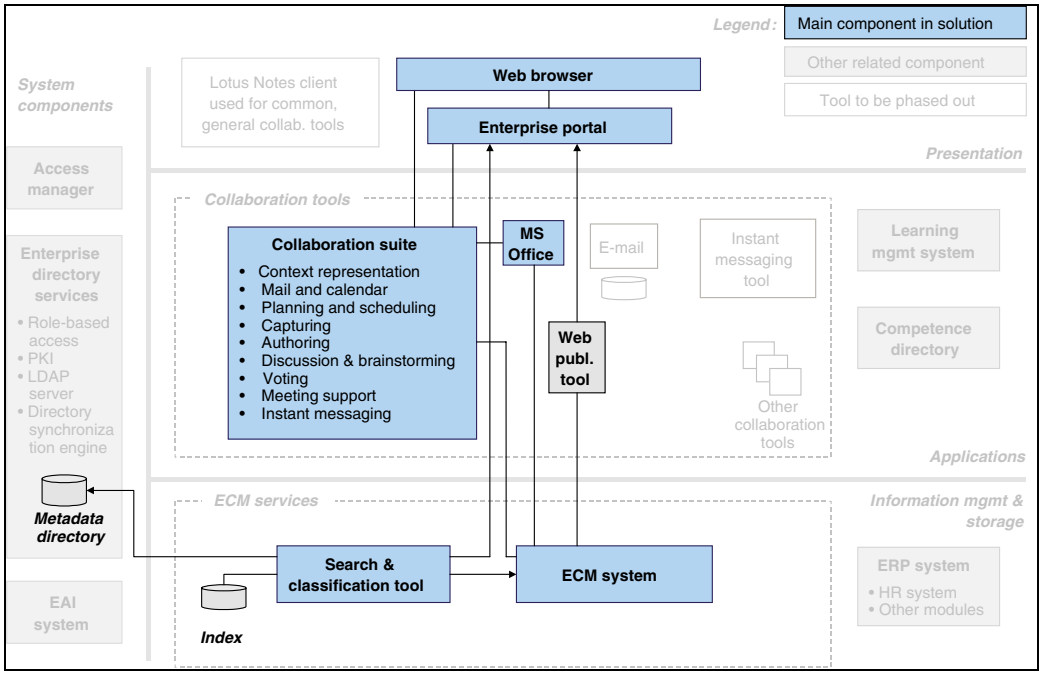

Figure 2 A description of architectural requirements related to Statoil's component infrastructure (October 2003).

applications, corporate metadata directory integrated with ECM system, and access control on various levels such as system, object, and object parts.

The procurement process evaluated three different vendors further. The decision processes in phase 5 were characterized as very rational, with specific decision criteria (Eim & Husby, 2004). Four working groups with representatives from the project and reference groups conducted the vendor evaluation. The heterogeneous project steering group actively involved the different business units. The heterogeneity encouraged different viewpoints, and the decision processes occasionally required negotiations between the different parties involved. Disagreements included the choice of platform. Phase 5 was mainly managed by the project sponsor, and the sponsor's role was quite dominating in this phase (Eim & Husby, 2004). Towards the end of the chartering phase the decision-makers gained increased understanding, which enabled them to get a firmer grip on the project and thus make decisions regarding the solutions. This came about towards the end of the chartering phase, immediately before the request for proposals and the subsequent vendor selection. Vendor selection and contract was concluded in December 2003. The acquired set of software packages was built on a Microsoft-compatible platform (Table 4).

In this phase, it is necessary to sketch a few features of the implemented solution that materialized a proportion of the stated requirements from the viewpoint of the end user to understand the subsequent development process. The screenshots of the team sites (Figure 3) and search (Figure 4) illustrate the solution as a knowledge reservoir at the levels of a project and the enterprise search, respectively.

Each employee in Statoil is attached to team sites to conduct their knowledge work and collaboration (Figure 3). The team site is a collaboration space that automatically captures the context (date, producer, team/project, etc.) of every piece of content produced and stored within the content management/portal framework. The team site also provides the collaboration tools needed by an employee, such as an overview of co-workers on the same team, documents, events, discussion forum and an integrated Outlook e-mail. The corporate-wide search tool (Figure 4) provides free-text search, advanced search features and opportunities to refine the

Table 4 The set of software products chosen

Software category	Products
Content and records management software	Meridio ECM and records management system. (www.meridio.com)
Collaboration management software	Microsoft Office System, including Live Meeting, Windows SharePoint Services
Web publishing software	Microsoft Office System, Microsoft Content Management Server
Search and content classification (taxonomy) software	Fast (www.fast.no) and Stratify (www.stratify.com)
Workflow	Microsoft BizTalk
Server software	Microsoft Office Live Meeting Server, Meridio Servers, Sharepoint Portal Server, Microsoft Content Management Server

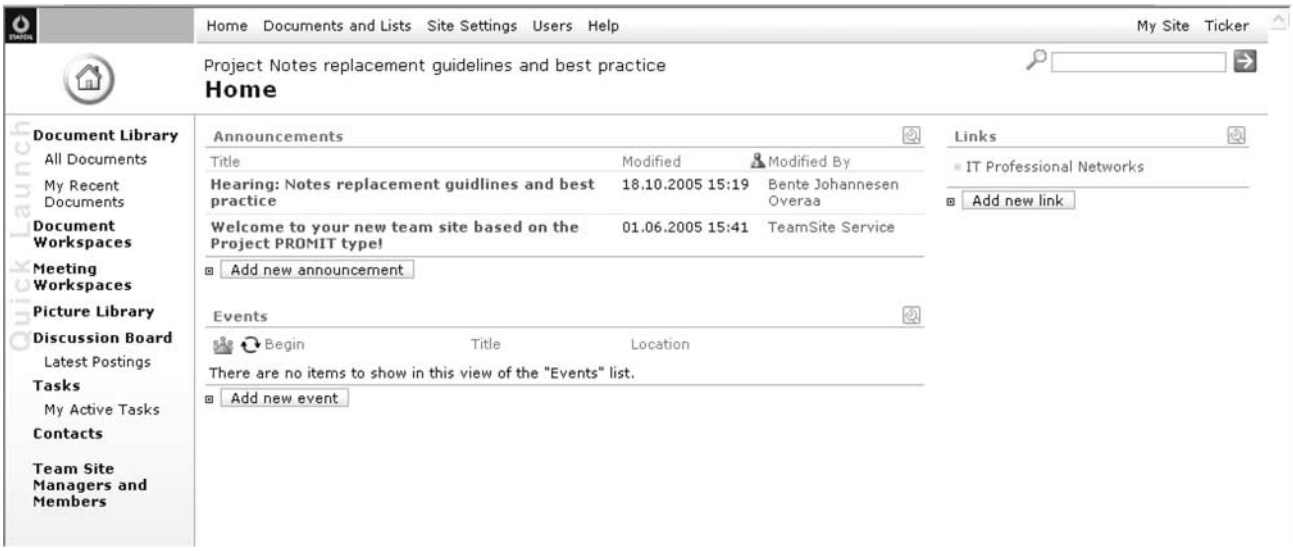

Figure 3 A team site structure for a project (October 2005).

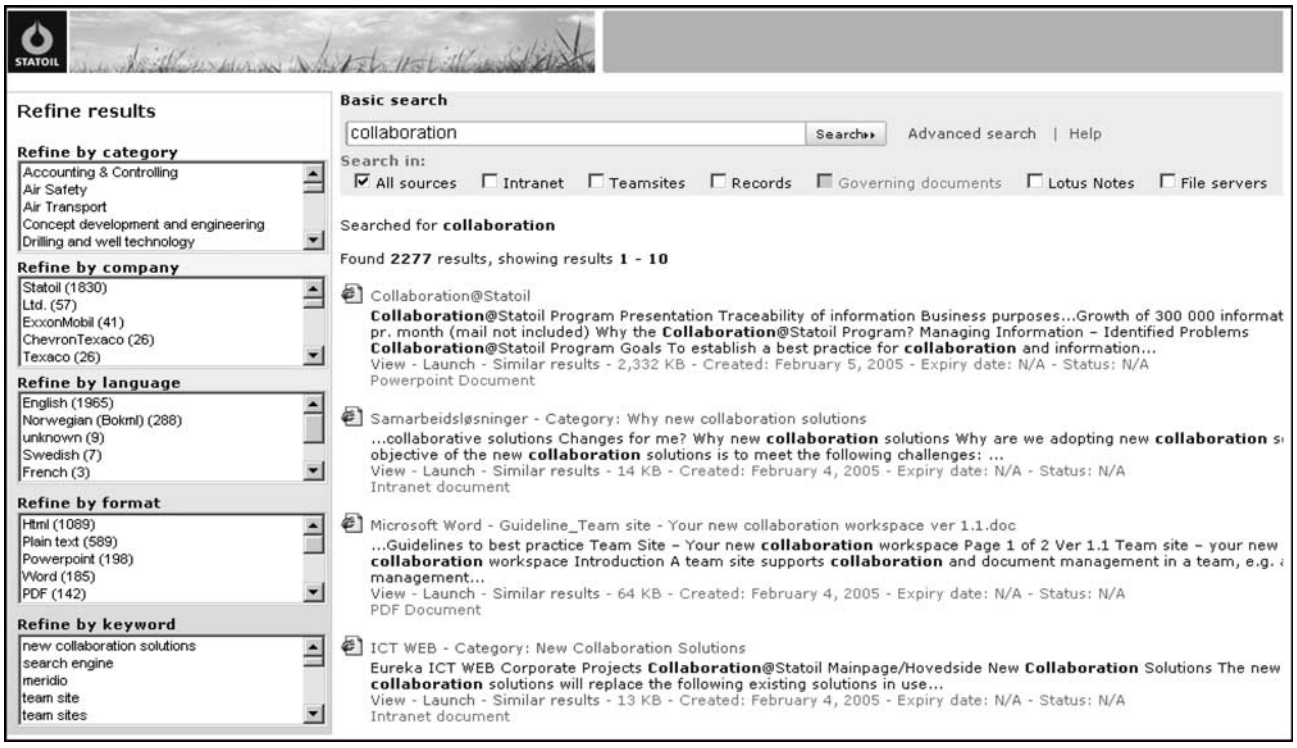

Figure 4 Corporate-wide integrated search (October 2005).

Table 5 An overview of the 42 highly critical issues raised by the 'out-of-the-box' pilot installation

Issue type	*Description*	*No. of highly critical issues*
Architecture	Issues related to the 'out-of-the-box' system architecture and infrastructure of the products and the integrated solution	18
Integration	Issues related to the integration of the products with other products/functional components in the 'out-of-the-box' solution	
Coexistence with as-is solution	Issues related to the new products' coexistence with existing solutions for collaboration and information management	8
Functionality	Issues related to the 'out-of-the-box' functionality of the products	13
Usability	Issues related to the user experience of the products, that is, interaction mechanisms, simplicity, flexibility, attractiveness and consistency	
Data migration	Issues related to the conversion and migration of information from the existing solution to the new solution	3

search according to automatically extracted metadata values. Advanced search provides refinement according to a pre-defined corporate taxonomy and a few major storage pools of content (e.g., Intranet, team sites, records, Lotus Notes, Governing documents, and File servers). Taken together, the team sites, corporate-wide integrated storage and search engines provide a powerful information environment, together with a communication environment, to be accessed through a corporate portal.

Phase 6 The design specification between January and September 2004 commenced with an 'out-of-the-box' pilot installation of the purchased products on Statoil's own ICT infrastructure. Through close collaboration with the main vendor and partners, the project members regarded this 6-week period as an intensive and vital learning experience. The pilot experimentation resulted in a number of concerns, conceptualized as 191 '*issues*' identified for resolution during the implementation (March 2004). The issues represented, again, '*weaknesses, challenges and uncertainties*' in the solution, against Statoil's strategic goals and RFP. 42 of the issues were categorized as highly critical, and 29 of these were considered to be of 'high' resolvability (Table 5). The issues document constituted the basis for the solution's

functional and non-functional specification, including 109 functional and 31 non-functional requirements. This document became the officially approved basis for the implementation.

The project members described the pilot installation as 'the moment of truth'. 'When you work on requirements specification, a vendor proposes their solution to you, and the response you get …[is] very firm. And you read it and you have lots of people involved and you spend a fortnight and you have a lot of models on how to do this. And when you then unpack the components …and you start playing with them, and then look back on the requirements specification: how are we going to do this? This is where the custom components come into the picture … And there are a lot of gaps, really, between an out-of-the-box solution and our vision' (October 2004). The conclusion of the issues document (March 2004) states: 'The study of the 'out-of-the-box' implementation… has identified several critical issues that must be resolved before the solution can be deployed in Statoil. If unresolved, some of the issues may imply that certain collaboration features will be less comprehensive than in the existing solution. However, both Statoil and the vendors believe that the majority of the issues can be resolved… without changing the proposed solution scope and implementation schedule, and that the functional limitations will not be significant compared with the improvements achieved through the new solution.' Four main types of possible solutions for the issues were identified (March 2004):

(1) The vendor resolves the issue
(2) A custom solution is developed for Statoil, by adding custom components
(3) The project changes the general-level solution concept or architecture (e.g., by replacing or adding 3rd party software products)
(4) Statoil changes policies, practices, solution requirements or implementation strategy/plan.

Some of the issues only required a simple configuration task, for example the search software and Internet Explorer integration. Some issues related to the existing constraints of chosen software and were reported as 'showstopper bugs' to be fixed by the vendor (1), for example disabling auto-collapse of categorized views in the user interface when re-opening them. The custom components design specification (2) was completed in August 2004 with strict prioritizations. Commenting on the outcomes of phase 6, the discipline advisor in *ECM* stated: 'the sponsor's expectations were mostly out-of-the-box, but we see that we need to do customization,… the initial focus then: implementing, and configure as little as possible. But we also had the out-of-the-box mindset with custom components. We do not aim at heavy re-configuration, but the custom components should be there to integrate the solution in a better way, and simplify the end user experience. And the end user experience is the main focus here, because we have promised the users … that implementing a new solution should be much simpler than the old version.' (October 2004). A total of 40 solution-integration requirements and 54 user-experience requirements were implemented as custom components in the first round. Solution-integration components included, for example, metadata flow, SharePoint-Meridio integration, unique content identifier, and mail integration. Custom components for enhanced user experience included team site creation wizards, links to Lotus Notes documents, and disabling user options and customized search pages. Custom components were developed by the internal service provider, Statoil ICT, in collaboration with vendors.

According to a project manager, the general-level solution concept or architecture (3) was not touched. However, changes to solution requirements and implementation plan (4) occurred. Despite of significant efforts of customization, several requirements were still (i) postponed to a later version, for example, team site integration with unified messaging, or (ii) workarounds were found, for example, role-based access management and task management in team sites, or (iii) the issue was not resolved, for example, site-specific presence status information, or (iv) it was decided as 'being outside the project's scope', for example, better integration between printers and the content capture infrastructure. Commenting on the emphasis on the 'out-of-the-box' approach, one key project member said: '… during the first half year there was a strong focus on staying within the out-of-the-box solution, but as we came closer to version 1.0, there was less and less focus on this' (June 2005).

During this phase, diverging viewpoints on functionality surfaced within the heterogeneous project steering group. The representatives from different solution domains advocated their needs. One of the project members stated (June 2005): '… maybe it was a struggle, … one had to prioritize and … those who worked with different parts of the solution wanted to promote their own components, of course. It was perhaps a competitive relationship … those who worked with the different parts of the solution, to get their own components prioritized first.' Another put it (February 2005): '…the constellation here is the technical environment versus the [ECM] domain environment… because the domain environment generally has … some priorities that are hard for the technical environment to understand why, and vice versa.'

Using the dialectical process lens for interpretation, we conclude that several contradictions suddenly became explicit in phase 6 in the form of 42 'critical issues' (March 2004). Hence, in this phase the dialectical motor of change dominated the development process, with the features of the commercial software contradicted by the organizational requirements (Figure 5).

Another dialectic emerged among the vendors and Statoil experts in collaboration, ECM, and technical IT domains. These three domains of expertise in Statoil

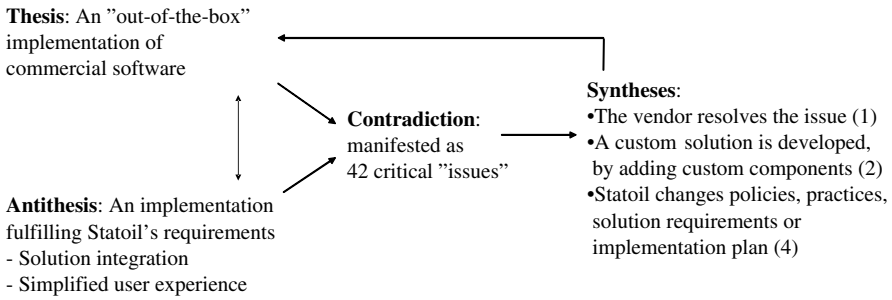

Figure 5 The Dialectic of adaptation in Statoil.

competed for the priority of their requirements. The main concern of the collaboration and ECM domain experts involved user functionality aspects. However, the main concern of the IT experts was the architectural feasibility of solution integration. The juxtaposition of priorities between experts from different knowledge domains constituted a major contradiction, combined with the solution's complexity representing the vendors' know-how. We conclude that although the teleological and life-cycle motors of change seemed to rationalize the actions of the project stakeholders, the dialectic motor of change strongly emerged during phase 6.

Phase 7 and beyond The solution version 1.1 went into production in January 2005. This marks the end of our study period (cf. Figure 1), but we include a brief description of the subsequent activities. The product verification period ended with a final approval in March 2005. The program continued with an implementation of version 2.0 from February to May 2005 (phase 8), and version 2.1 between June and September 2005 (phase 9). The new versions focused on the requirements previously postponed, and version 2 was the first to be rolled out into all the business units. Version 2 has a budget of 1.8 million Euro and is said to 'go further turning the vendors' off-the-shelf-solutions into an integrated suite directly supporting new Statoil work processes' (May 2005). Goals for version 2 include user experience issues such as 'simplify the collaboration and content management process' and solution integration issues such as 'improve metadata flow throughout the solution' and 'customize the tools so that they support new work processes.' (May 2005). In January 2006, the roll-out covered three of the six business units of Statoil and was targeted for completion in 2006.

Discussion

The Statoil case represents a strategic enterprise-wide effort of implementing content management, responding as such to the call by Smith & McKeen (2003) to narrow the gap of research on strategic ECM initiatives. To clarify our contribution further, we discuss the case in view of the five patterns introduced above: the teleological pattern of ERP implementations, the hybrid pattern of bottom-up evolution of ECM with teleological elements, the life-cycle pattern of ES implementation, the dialectical pattern of ERP implementation (with the dialectics of adaptation and the dialectics of learning), and the hybrid pattern of ERP implementation combining the life-cycle, teleological, and dialectical motors of change.

The explicit identification of 'content management pains' in Statoil together with the subsequent identification of eCollaboration strategy to solve those 'pains' indicates the existence of the teleological motor. However, the development program has exceeded the initial scope of the strategy (2002–2004) implying also other motors of change that have affected the implementation. The teleological motor cannot alone explain change and development issues of this case.

The Statoil case illustrates that an ECM implementation can truly be regarded as a type of ES due to its coverage and complexity. Hence, the previously suggested evolutionary framework (Scott *et al.*, 2004) of managing development of content management may appear insufficient for strategic ECM projects. Before, Statoil's information infrastructure had evolved bottom-up, resulting in thousands of non-integrated Notes databases and other recognized problem areas in content management (Munkvold *et al.*, 2003). The current approach represents a counterpoint suggesting that strategic, coordinated, and enterprise-wide efforts may appear timely after the more evolutionary period of the previous content management infrastructure. In short, Statoil begins their ECM program where the evolution ends by introducing a new and integrated ECM platform without prior evolutionary phases of individual applications.

The case demonstrably includes elements from the life-cycle pattern as well. The project was conceptualized as phases, which to some extent fit with the ideas of the chartering and project phases of the enterprise system experience cycle (Markus & Tanis, 2000). However, the pattern of Markus and Tanis' (2000) ES life-cycle does not fully fit the case. The number of packages involved in the solution (Table 4) may qualify this case for what Pettigrew (1990) labels an 'extreme' situation. The uncertainty involved in combining new technologies in a complex context may account for the 2-year work effort on

strategy and competence generation prior to project specification and vendor selection. This contrasts with a more limited project chartering phase typical for the life-cycle pattern of looking at ERP implementations (Markus & Tanis, 2000). Knowledge of the organizational requirements and the opportunities inherent in modern technology was gradually increasing, still being strategically coordinated by the management.

The dialectic of adaptation became truly visible in the project phase when the issues of user experience and technological solution integration challenged the hitherto dominant rhetoric of 'out-of-the-box' implementation. This differs a bit from the dialectic of adaptation concerning ERP systems. Whereas ERP packages typically provide an organization with readily implemented and rigidly adjustable business processes, organizational implementations of ECM software focus more on integrated storage and retrieval of information in general. The 'organization' thus can be more flexibly and continually (re)configured on top of the ECM platform with software integration and simplification for enhanced user experience instead of adapting processes to software (Davenport, 1998). That is, ECM involves less organizational adaptation of business processes than ERP.

With regard to the dialectic of learning, Robey *et al*. (2002) highlight differences between the *old* knowledge, represented by the prior business processes and legacy technologies, and the *new* knowledge represented by an ERP package. As mentioned, an ECM package does not necessarily force an organization to adopt any pre-implemented processes, although some packages do require certain taxonomies for organizing content and for example user management. However, the ECM users need new person-level skills and motivation to utilize the new solutions for the generic content processing tasks that relate to their various work situations. Hence, in ECM the dialectic of learning emerges between the previous user knowledge of the collaboration tasks *vs* the collaboration tasks suggested by the new solutions. Moreover, ECM implementation brought up contradictions between vendors' technical knowledge, Statoil's existing infrastructure and knowledge of needs for collaboration and content management. Hence, learning is achieved also through contradicting standpoints among the vendors and the other stakeholders from different corporate domains.

Altogether, the emerging contradictions led to sharpened prioritizations of implementation issues and organizational learning among the stakeholders. In general, the study addresses the need for compromise between simplified assumptions of utilizing commercial ECM software 'out-of-the-box' and simplified assumptions of full-fledged user experience with technical integration. A conscious strategy of looking for contradictions and pursuing constructive synthesis could help manage large scale ES projects: the more contradictions identified in the early phases, the better roll-out solutions in the shakedown phase. As ECM technology still remains relatively immature, vendors can be more attentive to learning about new issues from new implementation experiences, at least with prominent corporate clients, in order to improve their software further. Perhaps precisely due to the immaturity of commercial software, the building up of competence on technology, market, and internal needs for ECM took a long time, unlike in the current field of ERP. Hence, the dialectic of learning about ECM seems more to concern the technological infrastructure, project stakeholder priorities, and individual/team-level knowledge-task adjustments than business process change. All in all, the Statoil case sheds light on the dialectical motor of strategic ECM implementations; powered both by the inherent contradictions in the strategy, between the acquired software and existing IT infrastructure, and among the project stakeholders.

To summarize the discussion above, a hybrid theoretical pattern of change including elements from the teleological, life-cycle, and dialectical motors thus seems to be best suited to interpret the Statoil development program. As in the ERP literature (Besson & Rowe, 2001), the first phase started with a deterministic strategy and goals, which in the project phase were operationalized in relation to the technological constraints and organizational requirements. However, the chartering phase typical in ERP projects did not fully match the Statoil case. Here, a truly dialectical view of the development emerged already in the project phase and the project moved explicitly in the direction of creating syntheses and prioritizing between the conflicting views in the course of the project. This differs from the observations by Besson & Rowe (2001) who report that dialectics came into the picture mainly after the project phase between the users and the implementers of the system, as a technical/engineering viewpoint had dominated the ERP projects. Another distinction in the Statoil case was the contradiction already latent *within* the strategy: the simultaneous ideals of 'out-of-the-box' implementation *vs* user experience, which emerged as a contradiction in the project phase as the project stakeholders tried to operationalize both ideals simultaneously. With regard to ERP projects, Besson & Rowe (2001) address mainly the contradictions between different stakeholder goals, not contradictions inherent in project goals already from the beginning.

The greatest difference between the Statoil case and the hybrid model of ERP development (Besson & Rowe, 2001) is found in the ambiguity of the first phases of ECM development in Statoil *vs* the suggested clarity of the chartering phase of ERP systems development. We propose that such ambiguity may be due to the fact that the ECM technology has not matured to the extent that ERP technology has. Adoption and adaptation of immature technology may require more learning and flexibility for emergent project coordination than

adaptation of mature technology with available benchmarks, predictable benefits, and experiences from other enterprises. Hence, the first phases of the Statoil case actually consisted of a few *iterations* of teleological learning and goal clarification at the strategic level, during which the organization tried to learn and clarify the problems and needs of the organization as well as the possibilities inherent in the latest ECM software provided by commercial vendors.

Indirectly, however, awareness of the evolutionary motor affected the project, too. That is, the shortcomings in content management identified in the partially uncoordinated evolution of the previous Notes infrastructure provided the reason for explicit introduction of the teleological strategy and life-cycle-based large-scale organization for the current project. We thus argue for the value of discussing all four motors of change and development (Van de Ven & Poole, 1995) when theorizing about approaches to ECM implementation.

A potential weakness of our study resides in the problem of generalizing from a single case. We cannot say which approach to development – the managed evolution from individual applications towards integrated systems (Scott *et al.*, 2004) or the strategic approach with dialectics of this case – would be better with regard to common measures. The strategic development approach may actually suit organizations with reasonably stable businesses and economies of scale, whereas the evolutionary approach may suit the turbulent field of IT industry, represented by JD Edwards. However, our study contributes to the research by emphasizing the differences between these two development approaches. For ECM practitioners, awareness of the different motors of change could in itself facilitate the management of complex ECM projects. For example, whereas a teleological justification for initiating ECM may seem logical in the beginning, awareness of the dialectical and evolutionary motors, together with the life-cycle motor addressing the need for systematic retention of previous applications, may be needed to explain and accept changes in the plans. On the other hand, the Statoil case demonstrates the complexity of enterprise-wide content management initiatives, addressing needs for adequate allocation of resources for implementing such ambitions.

Conclusion

This paper is a response to calls for research on enterprise-wide, strategic development programs for ECM. It represents a revelatory case of such a viewpoint compared to the evolutionary, bottom-up content management projects. Alongside carefully scrutinized strategy and life-cycle-based project organizing, this wide-scale ECM initiative experienced noteworthy dialectics during the development process. The case study also complements previous process-based research on enterprise systems implementations, which has focused mainly on ERP systems. Based on this case study, we suggest that research on large-scale ECM implementations, as well as management efforts of such projects, should acknowledge the possible existence of all the four motors of change. Already, an awareness that development and change of ECM may be due to teleological, evolutionary, life-cycle and dialectical forces, may help to tackle the phenomenon.

Our further research goals include the continuing examination and evaluation of Statoil's large ECM program, which is expected to be finished in 2006. To complete this one-case study, research on other organizations focusing on ECM development programs should be conducted. Moreover, research on enterprise system implementation processes could benefit further from experiences related to other kinds of large-scale ESs in addition to ERP or ECM, including data warehouses, customer resource management, enterprise application integration and supply chain management systems. Especially, the management practices of large-scale programs to renew enterprise systems could profit from lessons learned beyond the mainstream teleological and life-cycle-based theorizing.

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References

ALAVI M (2000) Managing organizational knowledge. In *Framing the Domains of IT Management: Projecting the Future Through the Past* (ZMUD RW, Ed), pp 15–28, Pinnaflex Education Resources, Cincinnati, Ohio.

ALAVI M and LEIDNER D (2001) Knowledge management and knowledge management systems: conceptual foundations and research issues. *MIS Quarterly* **25(1),** 107–136.

BESSON P and ROWE F (2001) ERP project dynamics and enacted dialogue: perceived understanding, perceived leeway, and the nature of task-related conflicts. *SIGMIS Database* **32(4),** 47–66.

BJERKNES G (1992) Dialectical reflection in information systems development. *Scandinavian Journal of Information Systems* **4,** 55–77.

CMS WATCH (2005) CMS watch vendor lists. http://www.cmswatch.-com/Reports/Vendors/(accessed 2005-10-29).

DAMSGAARD J and SCHEEPERS R (2000) Managing the crises in intranet implementation: a stage model. *Information Systems Journal* **10(2),** 131–149.

DAVENPORT TH (1998) Putting the enterprise into the enterprise system. *Harvard Business Review* **76(4),** 122–131.

EHN P (1988) *Work-Oriented Design of Computer Artifacts*. Arbetslivscentrum, Stockholm.

EIM K and HUSBY Ø (2004) Decision processes in an eCollaboration setting – a case from Statoil. MSc Thesis, Department of Information Systems, Agder University College, Kristiansand.

HANSETH O and BRAA K (1998) Technology as traitor. SAP infrastructures in global organizations. In *Proceedings from 19th International Conference on Information Systems (ICIS)*, Helsinki, Finland (HIRSCHEIM, R, NEWMAN M and DEGROSS JI, Eds), pp 188–196, ICIS.

JENKINS T (2005) *Enterprise Content Management Technology. What you need to know*. Open Text Corporation, Waterloo.

KUMAR K and VAN HILLEGERSBERG J (2000) ERP experiences and evolution. *Communications of the ACM* **43(4),** 23–26.

LEE JC and MYERS MD (2004) Dominant actors, political agendas, and strategic shifts over time: a critical ethnography of an enterprise systems implementation. *Journal of Strategic Information Systems* **13(4),** 355–374.

LEE J, SIAU K and HONG S (2003) Enterprise integration with ERP and EAI. *Communications of the ACM* **46(2),** 54–60.

MACK R, RAVIN Y and BYRD RJ (2001) Knowledge portals and the emerging digital knowledge workplace. *IBM Systems Journal* **40(4),** 925–955.

MARKUS ML and TANIS C (2000) The enterprise system experience – from adoption to success. In *Framing the Domains of IT Management: Projecting the Future Through the Past* (ZMUD RW, Ed), pp 173–207, Pinnaflex Education Resources, Cincinnati, Ohio.

MATHIASSEN L and NIELSEN PA (1989) Soft systems and hard contradictions – approaching the reality of information systems in organizations. *Journal of Applied Systems Analysis* **16,** 75–88.

MONTEIRO E and HEPSØ V (2000) Infrastructure strategy formation: seize the day at statoil. In *From Control to Drift. The Dynamics of Corporate Information Infrastructures* (CIBORRA CU, Ed), pp 148–171, Oxford University Press, Oxford.

MUNKVOLD BE, PÄIVÄRINTA T, HODNE AK and STANGELAND E (2003) Contemporary issues of enterprise content management: the case of Statoil. In *Proceedings of the 11th European Conference on Information Systems* (CIBORRA CU, MERCURIO R, DE MARCO M, MARTINEZ M and CARIGNANI A, Eds) CD-ROM, Naples, Italy.

MUNKVOLD BE and TVEDTE B (2003) Implementing a portfolio of collaboration technologies in Statoil. In *Implementing Collaboration Technologies in Industry* (MUNKVOLD BE, Ed), pp 81–107, Springer, London.

NONAKA I (1991) The knowledge-creating company. *Harvard Business Review* **69(6),** 96–104.

NORDHEIM S and PÄIVÄRINTA T (2004) Customization of enterprise content management systems: an exploratory case study. In *Proceedings of the 37th Hawaii International Conference on System Sciences* (SPRAGUE JR RH, Ed), CD-ROM, IEEE, Los Alamitos.

PÄIVÄRINTA T and MUNKVOLD BE (2005) Enterprise content management: an integrated perspective on information management. In *Proceedings of the 38th Hawaii International Conference on System Sciences* (SPRAGUE JR RH, Ed), CD-ROM, IEEE, Los Alamitos.

PATTON MQ (1990) *Qualitative Evaluation And Research Methods*. Sage, Newbury Park, California.

PETTIGREW AM (1990) Longitudinal field research on change: theory and practice. *Organization Science* **1(3),** 267–292.

ROBEY D and BOUDREAU M-C (1999) Accounting for the contradictory organizational consequences of information technology: theoretical directions and methodological implications. *Information Systems Research* **10(2),** 167–197.

ROBEY D, ROSS JW and BOUDREAU M-C (2002) Learning to implement enterprise systems: an exploratory study of the dialectics of change. *Journal of Management Information Systems* **19(1),** 17–46.

SABHERWAL R and NEWMAN M (2003) Persistence and change in system development: a dialectical view. *Journal of Information Technology* **18(2),** 69–92.

SAWYER S (2001) A market-based perspective on information systems development. *Communications of the ACM* **44(11),** 97–102.

SCOTT J, GLOBE A and SCHIFFNER K (2004) Jungles and gardens: the evolution of knowledge management at J.D. Edwards. *MIS Quarterly Executive* **3(1),** 37–52.

SMITH HA and MCKEEN JD (2003) Developments in practice viii: enterprise content management. *Communications of AIS* **11(33),** 1–26.

SOH C, SIA SK, BOH WF and TANG M (2003) Misalignments in ERP implementation: a dialectic perspective. *International Journal of Human-Computer Interaction* **16(1),** 81–100.

SPRAGUE JR RH (1995) Electronic document management: challenges and opportunities for information systems managers. *MIS Quarterly* **19(1),** 29–50.

VAN DE VEN AH and POOLE MS (1995) Explaining development and change in organizations. *Academy of Management Review* **20(3),** 510–540.

WEI H-LH, WANG ETG and JU P-H (2005) Understanding misalignment and cascading change of ERP implementation: a stage view of process analysis. *European Journal of Information Systems* **14(4),** 324–334.

WEITZMAN L, DEAN SE, MELIKSETIAN D, GUPTA K, ZHOU N and WU J (2002) Transforming the content management process at IBM.com. In *Case studies of the CHI2002/AIGA Experience Design Forum, Minneapolis, April, 2002* (DYKSTRA-ERICKSON E, Ed), pp 1–15, ACM Press, New York.

YIN RK (1989) *Case Study Research – Design and Methods*. Sage, Newbury Park, California.

Corporate User Representatives and the Dialectics of Enterprise Systems: A Quest for Social Actors with Political Skill

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Abstract

Enterprise System implementations may be viewed as dialectics of adaptation. To reach a synthesis, a corporate user representative role is important. This paper addresses the question of who would be suitable for the role as a corporate user representative, i.e. what is required to fill the role.

Drawing on an in-depth interpretive study from the oil industry, this paper contributes by augmenting our view of the corporate user representative as a multidimensional social actor. The case is from an innovative integration of ECM with collaboration technology. With a state-of-the-art combination of technologies, the task of representing 26.000 users proved to be a challenge.

Based on longitudinal data, important corporate user representative characteristics are described as social actor dimensions. In terms of IS participation theory, the role is involved in a rich participation experience as a change agent. To fill this role, a corporate user representative should be a management function with political skill.

1. Introduction

In Enterprise System (ES) implementations value conflicts occur between stakeholders [1], and a dialectic perspective thus explains important aspects of the ES implementation process [2,3,4,5]. A dialectic perspective views change as the result of contradictory values competing for domination [6]. An important aspect is the dialectics of adaptation, where the customer requirements contradict an as-is implementation of the commercial software [3, 5].

This paper describes a case where the corporate user representative played a crucial role in reaching a synthesis in the dialectics of adaptation. Key issues were customer requirements concerning solution integration and user experience. According to the project managers the corporate user representative played a key role in the dialectics of adaptation. This raises the question, what kind of person should fill the role? Following a lead given by the project managers, this paper therefore reports on the case to address the question:

Faced with the dialectics of adaptation in Enterprise System implementations, who would fit the role as corporate user representatives?

This study focuses on an ES different from ERP. The case is a combination of technical solutions, involving an integration of Enterprise Content Management [7] (ECM) with collaboration solutions and personal productivity tools. A number of software systems are integrated, and user representation proved to be a challenging task.

The paper is organized as follows: section 2 presents previous research on user participation and theoretical frameworks. After a description of the research method in section 3, section 4 describes the case with findings on the role of the corporate user representative. Section 5 discusses the findings, concluding with implications for ES research and practice.

2. Background Literature

Theory is said to support the desirability of user participation in systems development [8]. User participation in the context of systems development is said to be one of the most researched topics in the IS literature [e.g. 9,10]. However, changing contexts such as ES require new research on user participation and in particular single-context studies [11].

This literature section is organized as follows. Relevant studies on user representation in systems development are presented first. Then relevant ES literature is reviewed. Finally three theoretical contributions are presented. All these contribute to the interpretation of the findings.

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2.1. User participation in systems development projects

The term corporate user representative is used to describe a role that represents the interests of ES stakeholders. In the context of systems development, end user representatives are said to have a most challenging and demanding role [12]. Such user representatives need a high level of interpersonal and communication skills, the ability to acquire technical knowledge in diverse areas, the ability to persevere in difficult circumstances, the ability to sustain a strong sense of mission, and patience. In systems development the developers' role is active. This implies that in a user-developer communication process, developers receive and interpret messages from users, and developers set priorities and take action [9].

Traditionally, three different forms of user participation have been identified in the literature: cross-functional project teams, steering groups, and project champions [13]. Project champions are usually individuals who, by virtue of their personal attributes, take a leadership role in ensuring acceptance and diffusion of the IT project. An important issue in a user participation structure, is the interaction between the team and the steering committee and the project champions [13].

The issue of who should represent the user population in systems development is a crucial one [12]. This emphasizes the research question raised above, i.e. what are "appropriate" corporate user representatives, in the context of ES?

2.2. Enterprise Systems literature on participation

An ES entails many stakeholders. They typically have multiple and often conflicting objectives and priorities, and rarely agree on a set of common aims [14]. The ES affects many types of users, and yet a low proportion of affected users have opportunities to participate [11].

Previous research addressing users in an ES context includes ERP value conflicts between stakeholders [1], users' role in ERP parameter settings [2], and power issues with the procurement of a CRM package [15]. The engagement of the users is considered a key variable with ES [16], but little research has focused on representing the users. In ERP projects, successful implementation is due in part to the management of user participation [2].

In an ERP context, a project champion performs the crucial functions of transformational leadership, facilitation, and marketing the project to the users [17]. Key activities include management of expectations, interdepartmental communication and cooperation, and minimal customization.

2.3. Users as social actors

In this context, a more sophisticated view of a corporate user representative is needed. The social actor [18] concept is therefore applied. The concept is based on roles and interest groups, and denotes a professional capable of mobilizing change. According to Lamb and Kling [18] users are better understood as organization members whose ICT-related actions can be characterized along four dimensions. Later Lamb [19] has added a fifth dimension called temporalities. These social actor dimensions are summarized in Table 1.

Table 1. Social actor dimensions [18,19]

Dimension	Description
Affiliations	Organizational and professional relationships that connect an organization member to industry, national and international networks
Environments	Stabilized, regulated and/or institutionalized practices, associations, and locations that circumscribe organizational action
Interactions	Information, resources, and media of exchange that organization members mobilize as they engage with members of affiliated organizations
Identities	Avowed presentations of the self and ascribed profiles of organization members as individual and collective entities
Temporalities	Socially constructed segmentations of time that shape the interactions of an organization member in response to the expectations of networked affiliates

The multidimensional view of a social actor [18] enables IS researchers to "address the social actor as an organization member who is representing the interests of the firm or department…". This appears to fit well with the corporate user representative role, and the social actor dimensions are therefore used as a framework to discuss the findings.

2.4. Political skill

The corporate user representative role involves social skills. An interesting type of social skill is termed political skill [20]. This is an interpersonal style that combines social astuteness with the ability to relate well. People who practice this skill behave in a disarmingly charming and engaging manner that inspires confidence, trust, sincerity and genuineness. Political skill is not a single trait or skill. Rather, it reflects an integrated composite of internally consistent and mutually reinforcing and compatible skills and abilities that defies precise description. It is a style-type of component, a way of putting thoughts into words. Another feature of political skill relates to how people accumulate forms of personal, non-financial capital. Individuals with social skill invest in the development of their reputations [20].

2.5. Participation theory

To revitalize participation as an important area of IS theorizing and research, Markus and Mao [11] outline key elements of a theoretical framework for IS participation. This theory distinguishes between stakeholders, participants and change agents. Stakeholders are likely to be affected by a solution, participants are the subsets of stakeholders who are actually given the chance to participate in implementation activities. Change agents are people who play important roles in designing and executing participation opportunities for stakeholders. Participation activities may be divided into different types, e.g. solution design, solution implementation, and project management. Participation richness is another concept in this theory, i.e. the extent to which the participation activities are meaningful and enable participant influence [11].

3. Research Methodology

This paper is part of an ongoing research effort with Statoil, a large Norwegian oil company. In 2002, Statoil launched a corporate-wide collaboration and ECM program, and the author is one in a group of researchers that has studied the development from the start. This includes access to important project documents and interviews with key project staff, and is reported elsewhere. Table 2 summarizes the data sources used for this paper, which are referred to by date. There was a partial "snowball" [21] sampling of informants, to locate information-rich key informants. As seen from Table 2, the data reflect viewpoints from different levels and roles within the project. The study therefore represents an analysis of the experiences and interpretations of nine key actors in the project.

Table 2. Data sources

Date	Type of data
12.2005	Interviews with the two project managers, informants 1 and 2
10.2006	Initial interview with the QA/first corporate user representative, informant 3
02.2007	Follow-up interview with the QA/first corporate user representative, informant 3
03.2007	Interviews with the second and third corporate user representative, informant 4 and 5
04.2007a	Interviews with two reference group members, informants 6 and 7
04.2007b	Interviews with two steering committee members, informant 8 and 9

The principal data collection method was in-depth, semi-structured interviews, combined with background information from previous studies. To combine focus with openness, a general interview guide approach was combined with an informal conversational interview, to "go with the-flow" [21]. All interviews were audio-taped and transcribed. Translations into English have been checked by a linguist. To increase knowledge as the interviews progressed, an interim analysis [22] was performed and the interview guide evolved. The study has been guided by Pettigrew's [23] advice on longitudinal research on change, exploring the larger context of 2002-2007 and in particular how changes emerged.

Interviews with the project's two subsequent managers (12.2005) initiated this research, since they emphasized the importance of the corporate

user representative. As the dialectics of adaptation brought the role of the corporate user representative into focus, the theoretical construct of political skill [20] was found to be potentially relevant. Together with the dialectics of adaptation, this became a sensitizing concept [21] to guide further data collection and analysis. The definition of political skill [20] was presented to the informants to validate the concept's relevance for the corporate user representative role.

The data analysis started with coding schemes based on interview guides, data reduction and displays [22], and continued with an inductive analysis [21] of themes and categories occurring in the data.

An alteration between the different theoretical viewpoints presented above, emerged as a useful approach during the analysis of and reflection upon the case data. This is in line with qualitative data analysis as an iterative process [22] and fits an interpretive stance. Several iterations of analysis of the initial interviews (12.2005 and 10.2006) occurred in parallel with a search for appropriate theoretical lenses. The research methodology therefore followed a hermeneutical circle [24] until the parts of data from the initial interviews (12.2005, 10.2006) were considered consistent with the theoretical whole. This sharpened the focus for the remaining interviews (02.2007 through 04.2007b).

4. Statoil's ES project: Background and case description

Statoil is the third largest exporter of crude oil in the world, with approximately 25,600 employees in 33 countries in 2006. The company operates 60% of all Norwegian oil and gas production. The company consists of seven business units, each with an IS/IT manager.

Statoil was one of the world's largest users of Lotus Notes/Domino in the 1990s [25]. The IT architecture evolved into a portfolio of technologies with partly overlapping functionality and applications, resulting in an information infrastructure scattered over a number of different storage media and applications. This caused major challenges related to information retrieval, version control and information quality [26]. Statoil's volume of information objects grow at a rate of about 300,000 per month. In response, Statoil's corporate IS/IT service therefore launched a major ECM and collaboration development program in 2002. The time frame of the project is presented in Table 3.

Table 3. Time frame for the ES implementation

Year	Main activities
2002	Strategy, Feasibility study of vendors
2003	Feasibility study of the organization, Procurement process
2004	Building and integration of the solution
2005	Pilot implementation, General release, Stabilizing the solution
2006	Organizational implementation in all business units
2007	New releases, Solution in production

Table 4. The set of software products chosen

Software category	Products
ECM software	Meridio ECM and records management system. (www.meridio.com)
Collaboration management software	Microsoft Office System, including Live Meeting, Windows SharePoint Services
Web publishing software	Microsoft Office System, Microsoft Content Management Server
Search and taxonomy software	Fast (www.fast.no) and Stratify (www.stratify.com)
Workflow	Microsoft BizTalk
Server software	Microsoft Office Live Meeting Server, Meridio Servers, Sharepoint Portal Server, Microsoft Content Management Server

4.1. Technologies

The technologies that constitute the ES are summarized in Table 4. Each employee in Statoil is attached to team sites to conduct their knowledge work and collaboration. The team site is a collaboration space that automatically captures the context (e.g. date, producer, team, and project) of every piece of content produced and stored within the ECM. The team site also provides the collaboration tools needed by an employee, such as an overview of co-workers on the same team, documents, events, discussion forum and an integrated Outlook e-mail. The

corporate-wide search tool provides advanced search features and refinement according to a pre-defined corporate taxonomy. Taken together, the team sites, corporate-wide integrated storage and search engines provide a powerful information environment, to be accessed through a corporate portal. The installation differs considerably from standard [3], and the case is therefore a complex ES solution, based on a combination of technologies. The task of representing 26.000 users therefore proved to be a considerable challenge.

4.2. Project organization

The project was organized with the CIO as sponsor, a steering committee, a project group, and a reference group with representatives from the business units (Figure 1). The reference group discussed user requirements and user acceptance. The steering committee consisted of process owners and IS/IT managers from different business units, having a customer role. The sponsor represented corporate management, was financially and commercially responsible, and chaired the steering committee. The project group was staffed by corporate services IS/IT. Vendors and other consultants were involved as needed.

Two project managers were involved, one from 2002 to the summer of 2005, the other since 2005. According to them, Statoil's business units were the most important stakeholders in influencing the contents of the solution (12.2005). According to Munkvold et al. [27], project members expressed that they had relatively good access to project information, but reference group members expressed a certain lack of information. The involvement of users and business representatives was strong, and the use of a reference group served to obtain input and requirements from the business units and users. The overall impression was that the business units were well involved, but that varied.

4.3. The Corporate User Representative role

The term corporate user representative may be inadequate to describe the role in Statoil. The role is literally translated "user-professionally responsible", but is officially titled "corporate user responsible". The corporate user representative is a professional within a domain that is important for the business units. (S)he is responsible for representing the professional interests of the business units and their users. The corporate user representative works for the sponsor, and all changes in the project are approved by the corporate user representative or the sponsor. At the outset the quality assurance (QA) responsible had the role, but at the end of the project chartering phase the need for a corporate user representative role crystallized (04.2007b). The first corporate user representative was then appointed, and he mobilized reference groups consisting of representatives from relevant discipline networks and various business units representing end users. It is important to note that the role is not an "end user" representative as such, but rather a representative for the business units who are the ES customers (c.f. Figure 1).

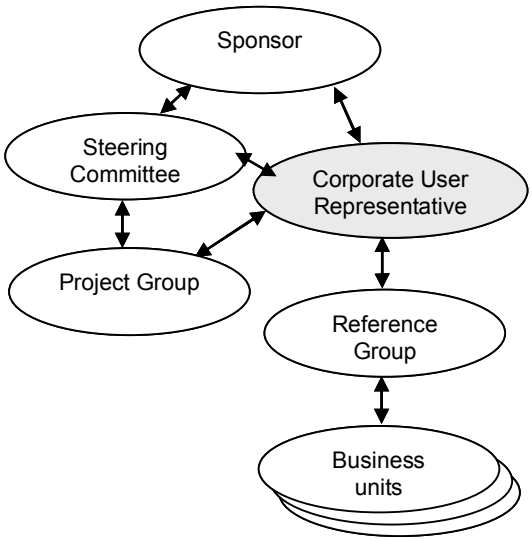

Figure 1. The context for the corporate user representative

Typical key words used by the informants to describe the role are the following:

- Listener (5)
- Facilitator (3)
- Broker (1) and catalyst (1)

These key words (with occurrences) describe the role when dealing with the business units' requirements. Other characteristics of the role were also used, and these are summarized in Table 5.

The corporate user representative is viewed as an exposed position, and therefore no "ordinary" user is assigned the role. It is also considered a management role. During the

project three different individuals have filled the role, for natural turnover reasons. These were appointed by the sponsor, each having different backgrounds, formal positions and personal characteristics. Their backgrounds were from IS/IT, as chief engineer, senior engineer and project and product management. The one with a chief engineer background was characterized as "…he certainly has more weight in the organization, he brings a history with him, into the role. Which maybe NN [the current person] is actually missing" (04.2007b). Lacking such a background, the current person is said to have "a good share of personal power, and he is very capable, so he certainly handles the challenge better than most people would… But it confirms that… I do not think this [political skill] is enough" (03.2007).

Table 5. Characteristics of the corporate user representative role

Character-istic	Description
A management role	Representing 26.000 users, with the task of securing clear instructions for the project, is clearly considered a management role (03.2007, 04.2007b)
A single point of contact	A single point of contact is considered crucial with such a heterogeneous enterprise solution, a connecting link between the business units and the project (03.2007)
Communi-cates require-ments to the project	Based on discussion with the business units, requirements are structured, prioritized and verified by the corporate user representative (02.2007, 03.2007, 04.2007b)
Communi-cate results back to the customer	The scope of the solution's next version is important to communicate back to the business units. Explaining the reasons for constraints and limitations is vital (02.2007, 03.3007, 04.2007a)

The informants had different perspectives on how the role is to handle requirements, as seen in Table 6. Those who had filled the corporate user representative role themselves, emphasized their decision making role more than the other informants did.

Table 6. Different outlooks on how the corporate user representative should handle requirements

Informants	View of handling requirements
Steering Committee	Collect the requirements from the business units, have them structured and prioritized (04.2007b)
Corporate user representative	Take care of the requirements, evaluate and prioritize them, and adjust them according to the strategy. Make a decision and stand firm. Describe scope and decide on changes in functionality. (10.2006; 03.2007).
Reference Group	Represent the interests of the business units and users by taking care of all the requirements, without picking out some of them (04.2007a).

4.4. The Corporate User Representative and the dialectics of adaptation

In this project, customer requirements concerning solution integration and user experience contradicted an as-is implementation of the commercial software. Especially in the project phase when the dialectics of adaptation occurred, the project manager needed a strong corporate user representative who could give direction by expressing the requirements of the business units. "As soon as we started to 'turn on' functionality [i.e. beyond standard], we had a greater need for acquiring … a strong and commanding user responsible, that really could put the business' requirements down on paper" (12.2005).

The dialectics of adaptation poses great challenges for the role. According to the corporate user representative involved in the most intense phase of dialectics, it involved different levels and tensions (c.f. Figure 1). These are summarized in Table 7, and express the viewpoints of the corporate user representative.

Priorities between experts from different knowledge domains constituted a major contradiction, and the corporate user representative had an important broker role. According to one informant "there has

presumably always been a tension between the steering committee and the project as to how far we should go concerning the local adaptation…" (12.2005). In particular the tension was between the steering committee and the corporate user representative, according to this informant. The steering committee expressed a lack of information that some of their decisions implied local adaptation (04.2007b). The tensions with the reference group resulted in massive protests from the user communities, referred to as "the violent storm broke out" (03.2007).

Table 7. Snapshots of the dialectics of adaptation at different levels

Level of the dialectic	The corporate user representative's position in the dialectic
Tensions with the Project Group	"Is this really not possible to solve, with the products we bought?" (03.2007)
Tensions with the Steering Committee	"We have a problem here, what we bought turned out to be less flexible than we thought" (03.2007)
Tensions with the Reference Group	"We have to change the scope, [we need to] do things differently, and the solution will be different from what we decided" (03.2007)

4.5. The quest for a good Corporate User Representative

The informants stated several personal characteristics that are crucial for this role, and these are summarized in Table 8. The first point emphasized above all is to be a good listener, although this did not always occur in practice: "I feel that it easily becomes so that… [he] does things a little like he wants, doesn't he?" (04.2007a).

An ability to understand the big picture is an important characteristic. This requires both domain knowledge and sufficient technical knowledge to see consequences of requirements. Domain knowledge across such a heterogeneous solution (Table 4) is a challenge, and some of this knowledge has to be acquired during the project. When presented with a definition of political skill, all informants verified that this certainly is important for the role. While it is necessary, it is not considered sufficient. A combination of personal characteristics and competence are also necessary for a good corporate user representative.

Table 8. Important personal characteristics of a good corporate user representative

Personal characteristic	Description
Good communicator (02.2007, 03.2007, 04.2007a, 04.2007b)	A good listener who is open for ideas (s)he does not necessarily agree with. Sensitivity to engage in a positive dialogue with the customers. Engage the users to give input. Verify understanding, "was this what you really meant?" Ability to speak plainly, including ability to say "no".
Consensus builder (04.2007b, 04.2007a)	Being able to find unifying solutions. Reaching consensus by talking through a common priority with the business units, instead of decisions by voting. "One who navigates between the actors".
Domain competence and technical competence (03.2007, 04.2007a, 04.2007b)	Ability to understand the big picture. Understand the totality of the solution and the long term technical consequences of the suggested requirements. Point out alternative solutions, ability to make propositions. The ideal: knowledge of all the application domains in the solution, a competence that matches the discussion partners' competence.
Political skill (02.2007, 03.2007, 04.2007a, 04.2007b)	Expressed as: - A good share of personal power - Accumulated personal capital, "more weight in the organization" - "The power to shape and prepare for decisions".

5. Discussion

This paper is an attempt to augment and refine our view of the corporate user

representative as a multidimensional social actor. The role in this case adds to the social actor dimensions [18,19] as summarized in Table 9. Although not the object of study, the dialectics of adaptation constitute an important background for understanding the corporate user representative's challenges. The implications of this study are a focus on the two dimensions of *interactions* and *identities*, although with a different emphasis.

Table 9. Social actor dimensions of the corporate user representative

Dimension	Description
Affiliations	Enterprise, project sponsor
Environments	ES context: Sarbanes-Oxley compliance, government regulations, mergers
Interactions	The main interactions are with sponsor, steering committee, project group and reference group (c.f. Fig 1). The role is a single point of contact that communicates requirements to the project, and communicates results back to the business units. The interactions require political skill, being a good listener and communicator, able to negotiate unifying decisions.
Identities	It is clearly considered a management role, it requires domain and technical competences. The role requires an understanding of the totality of the solution, i.e. knowledge of application domains, and technical competence to comprehend long term consequences of the requirements. The role is a change agent, who needs political skill.
Temporalities	The corporate user representative role exists only within the ES implementation project. A long project period (2002-2007) meant that different individuals filled the role.

5.1. Interactions

To deal with the dialectics of adaptation in this complex ES context [3], interactions constitute a key issue. What has been advocated as an effective user participation structure [13] is incorporated in this case. However, the corporate user representative's interaction has a different focus than a project champion. More than ensuring acceptance and diffusion of the ES project, the interactions' main emphasis is on communicating requirements to the project. The role therefore goes beyond the project champion of ERP projects [17].

The required skills for interactions are similar to those needed by user representatives in systems development projects [12]. The corporate user representative addresses the crucial issue of who should represent the user population, with a clear management support. The management support is twofold in this case, (i) it is based on the project sponsor, (ii) the role should have a management identity as discussed later. Interactions in this representative type of user participation imply a considerable depth of indirect user participation [c.f. 8]. The participation involves all stages of the development process, it involves frequent interactions, and the users had an indirect voice in the development process. Contrary to a user-developer communication where developers interpret messages from users, set priorities and take action [9]; it is the corporate user representative who receives and interprets messages from users, sets priorities and prepares for decisions.

The *political skill* concept [20] appears to be a pertinent summary of several of the corporate user representative's interaction aspects, and all the informants confirmed that this is important. Necessary personal characteristics of the role that fit with political skill include: personal power, accumulated personal capital, and the power to shape and prepare for decisions. The following keywords used to describe the role, also fit with the political skill concept: facilitator, broker and catalyst. I.e. being a good listener who is able to find unifying solutions. Political skill is further discussed in the section on identities.

Interactions also relate to activities of IS participation theory [11]. The interactions may be categorized as a change management participation activity type, as the participation activities are related to the solution's scope. The interactions may also be categorized as a rich

participation experience, which therefore may be expected to have a strong relationship with the solution's success [11].

5.2. Identities

Due to the dialectics of adaptation, the identities dimension is important. The corporate user representative is a social actor who represents business units. An important finding is that *a corporate user representative in an ES context has to be a management role*. Although not a manager, to represent 26.000 users in business units with different interests, requires a management role. The informants were emphatic on this point, and this harmonizes with the need for management of user participation in ES [2].

In the identities dimension of the corporate user representative, the ICT use component [18] is subordinate. However, ICT knowledge is important, together with application domain knowledge. Not only is the ability to acquire technical knowledge in diverse areas important [c.f. 12]; but in this ES context a comprehension of the whole and of the long term technical implications of chosen alternatives is vital. A focus on the whole and on the long term consequences also underlines the management identity of the corporate user representative.

Identities also relate to IS participation theory [11]. One aspect is the role as a full-time project participant on behalf of important stakeholders. The corporate user representative also plays an important role as *change agent*, i.e. designing participation opportunities for stakeholders. The corporate user representative was active in appointing the reference group and in obtaining input from the business units' users. Another change agent dimension is to shape and prepare for decisions. As both a participant and a change agent, the role spans two disjoint categories in Markus and Mao's [11] theory. The reason may be that there is a tension in the role, it is a combination of user representation and a management role.

Although the social actor model is fundamentally integrated with ICT use, it accommodates important characteristics of the corporate user representative role. Agency is indeed channelled through a complex, multilevel system of networks and organizational affiliations. IS participation theory adds to the social actor dimensions, although two categories overlapped.

ES is a context that requires new research on user participation [11]. As typical with ES [1,14], the stakeholders had multiple and often conflicting objectives and priorities. Still the stakeholders were to a large extent able to agree on a set of common aims, by means of the corporate user representative role as a broker and facilitator. However, the reference group had a different perspective on decision making than the project group and the steering committee (Table 6). This illustrates the challenging role of corporate user representative due to the dialectics of adaptation, where the reference group was deeply involved (Table 7).

Political skill is also an identity dimension, as the best corporate user representatives were said to have personal power, good reputations and a history in the enterprise. Although important, political skill appears insufficient to handle the dialectics of adaptation. With the words of one deeply involved: "I do not think this [political skill] is enough" (03.2007).

In a dialectic perspective, contradictory forces are competing for domination [6]. To get one's way as a change agent in the face of resistance [29] requires power. The concept of power [28] is therefore another important perspective for insights on the corporate user representative role. However, a discussion of power is too comprehensive for the scope of this paper, and deserves a thorough treatment in future studies. Further research is also needed to focus on which aspects of political skill are the most important for the corporate user representative role.

6. Conclusion

This paper portrays a corporate user representative role that served as a single point of contact between the business units' users and the ES implementation project. This turned out to be an important role in view of the dialectics of adaptation.

A good corporate user representative in an ES implementation project may be hard to find. In a quest for a good candidate, two social actor dimensions were particularly important for the role:

(i) Interactions - a good communicator with political skill, involved in a rich participation experience, being able to deal with contradictory interests;

(ii) Identities - a management level change agent, with both technical and domain knowledge.

7. References

[1] Allen, J.P. (2005). "Value conflicts in enterprise systems." Information Technology & People 18(1): 33-49.

[2] Besson, P. and F. Rowe (2001). "ERP project dynamics and enacted dialogue: perceived understanding, perceived leeway, and the nature of task-related conflicts." SIGMIS Database 32(4): 47-66.

[3] Nordheim, S. and T. Päivärinta (2006). "Implementing enterprise content management: from evolution through strategy to contradictions out-of-the-box." European Journal of Information Systems 15(6): 648-662.

[4] Robey, D., J.W. Ross et al. (2002). Learning to implement enterprise systems: an exploratory study of the dialectics of change. Journal of Management Information Systems 19(1), 17-46.

[5] Soh C., S.K. Sia et al. (2003). Misalignments in ERP implementation: a dialectic perspective. International Journal of Human-Computer Interaction 16(1), 81-100.

[6] Van De Ven, A.H. and M.S. Poole (1995). Explaining development and change in organizations. Academy of Management Review 20(3), 510-540.

[7] Smith, H. A. and J. D. McKeen (2003). "Developments in Practice VIII: Enterprise content management." Communications of the Association for Information Systems 11(33): 1-26.

[8] Lynch, T. and S. Gregor (2004). "User participation in decision support systems development: influencing system outcomes." European Journal of Information Systems 13: 286-301.

[9] Gallivan, M. J. and M. Keil (2003). "The user-developer communication process: a critical case study." Information Systems Journal 13(1): 37-68.

[10] Wang, E. T. G., H. H. Chen, et al. (2005). "Interaction quality between IS professionals and users: impacting conflict and project performance." Journal of Information Science 31(4): 273-282.

[11] Markus, M.L and J.-Y. Mao (2004). "Participation in Development and Implementation - Updating An Old, Tired Concept for Today's IS Contexts". Journal of the Association for Information Systems 5 (11-12): 514-544.

[12] Damodaran, L. (1996). "User involvement in the systems design process - a practical guide for users." Behaviour & Information Technology 15(6): 363-377.

[13] Vadapalli, A. and M.A. Mone (2000). "Information technology project outcomes: user participation structures and the impact of organization behavior and human resource management issues". J. Eng. Technology Management 17: 127–151.

[14] Sedera, D., G. G. Gable, et al. (2004). Measuring enterprise systems success: the importance of a multiple stakeholder perspective. Proceedings of the 13th European Conference on Information Systems, Turku, Finland.

[15] Howcroft, D. and B. Light (2006). "Reflections on issues of power in packaged software selection." Information Systems Journal 16(3): 215-235.

[16] Markus, M. L. and C. Tanis (2000). The Enterprise System Experience - From Adoption to Success. Framing the domains of IT management : projecting the future through the past. R. W. Zmud. Cincinnati, Ohio, Pinnaflex Education Resources: 173-207.

[17] Somers, T.M. and K.G. Nelson (2004). "A taxonomy of players and activities across the ERP project life cycle". Information & Management 41: 257–278.

[18] Lamb, R. and R. Kling (2003). "Reconceptualizing Users as Social Actors in Information Systems Research." MIS Quarterly 27(2): 197-235.

[19] Lamb, R. (2006). "Alternative Paths Toward a Social Actor Concept". Proceedings of the Twelfth Americas Conference on Information Systems, Acapulco, Mexico: 4113-4123.

[20] Ferris, G. R., P. L. Perrewe, et al. (2000). "Political Skill at Work." Organizational Dynamics 28(4): 25-37.

[21] Patton, M. Q. (1990). Qualitative evaluation and research methods. Newbury Park, Sage.

[22] Miles, M. B. and A. M. Huberman (1994). Qualitative Data Analysis: An Expanded Sourcebook. Thousand Oaks, Calif., Sage.

[23] Pettigrew, A. M. (1990). "Longitudinal Field Research on Change: Theory and Practice." Organization Science 1(3): 267-292.

[24] Klein, H. K. and M. D. Myers (1999). "A Set of Principles for Conducting and Evaluating Interpretive Field Studies in Information Systems." MIS Quarterly 23(1): 67-93.

[25] Munkvold, B. E. and B. Tvedte (2003). Implementing a Portfolio of Collaboration Technologies in Statoil. Implementing Collaboration Technologies in Industry. B. E. Munkvold. London, Springer: 81-107.

[26] Munkvold, B. E., T. Päivärinta, et al. (2003). Contemporary Issues of Enterprise Content Management: The Case of Statoil. Proceedings of the 11th European Conference of Information Systems, Naples, Italy.

[27] Munkvold, B. E., K. Eim, et al. (2006). "A Case Study Of Information Systems Decision-Making: Process Characteristics And Collaboration Technology Support." International Journal of Cooperative Information Systems 15(2): 179-203.

[28] Jasperson, J. S., T. A. Carte, et al. (2002). "Review: Power and Information Technology Research: A Metatriangulation Review." MIS Quarterly 26(4): 397-459.

[29] Markus, M.L. (1983). "Power, Politics, and MIS Implementation." Communications of the ACM 26(6): 430-444.

ENTERPRISE SYSTEM IMPLEMENTATIONS: ORGANIZATIONAL INFLUENCE PROCESSES FOR CORPORATE USER REPRESENTATIVES

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ENTERPRISE SYSTEM IMPLEMENTATIONS: ORGANIZATIONAL INFLUENCE PROCESSES FOR CORPORATE USER REPRESENTATIVES

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Abstract

Enterprise system implementation is a complex and large undertaking. Business requirements does not necessarily fit the inherited as-is features of the software. To reach agreement on features to implement requires prudent management and astute exercise of power.

In this paper we draw on an in-depth, interpretive study from the oil industry, where we analyze a case of innovative integration of an ECM system with collaboration technologies. The data collection has been longitudinal. The data analysis has been performed through the perspective of organizational influence processes.

The main finding concerns an organizational role as corporate user representative to deal with the scale and complexities of implementation. A single person was particularly influential in the role. At the outset a user representative had to perform upward influence processes from a lower formal position. This is impeding the responsibilities associated with the role. A corporate user representative in a high formal position and with lateral and downward influence processes to the steering committee and the project group was more influential. Challenging upward influence processes was thus avoided.

Typical influence tactics include rational persuasion and consultation. In addition, the corporate user representative benefits from a strong reference group to give input from the organization.

Keywords: organizational influence processes, enterprise systems, implementation, corporate user representatives.

1 INTRODUCTION

Enterprise system (ES) implementation is often a complex and large undertaking. Business requirements does not necessarily fit the inherited as-is features of the enterprise software. In ES implementation value conflicts occur between stakeholders (Allen, 2005), and ES implementation may even be viewed in a dialectic perspective (e.g. Besson and Rowe 2001, Nordheim and Päivärinta, 2006). It requires prudent management and astute exercise of power to reach agreement on features to implement across several departments as well as issues inherent in the scale and complexity of an undertaking as ES implementation.

In information systems (IS) research the issue of power has received some attention. IS development and implementation has long been characterized as a highly political process (Grover et al., 1988). Although power is crucial in the interplay between information systems and organization (Baskerville and Smithson, 1995), the study of power is said to have been marginalized in IS research in the last 20 years (Howcroft and Light, 2006). In their review of power in IS research, Jasperson et al., (2002) state that power is a complex phenomenon that best can be viewed and understood as consisting of multiple layers.

The development of large scale IS is a political process (Kling and Iacono, 1984), and agents of organizational change include IS specialists (Markus and Benjamin, 1996). Enterprise systems are said to require new research on user participation (Markus and Mao, 2004). An ES entails many stakeholders with multiple and often conflicting objectives and priorities (Sedera et al., 2004). Users and their relative power is therefore an issue in the context of ES, and the dialogue between users and designers is important (Besson and Rowe, 2001). Since users rarely are involved in the decision to launch the project, this gives rise to conflicts (Besson and Rowe, 2001). Users are given more attention in the shakedown and onward and upward phases (Markus and Tanis, 2000). A study of power issues in ES implementation shows that technical power, structural power, conceptual power, and symbolic power may be exercised by the IT management. These four categories of power are interwoven, and both overt and covert power is exercised (Howcroft and Light, 2006). Conflict and its resolution are more likely to occur when users can exercise their influence in the development process, in what may be described as constructive conflict (Robey and Farrow, 1982). There is a fine balance of power to be maintained between the stakeholder groups in order to achieve a harmonious outcome (Skok and Legge, 2002).

While some research has focused on power in ES implementation, we have studied a case where previous research is insufficient to explain a central power base, namely the role of the corporate user representative. We have chosen to apply the theory of organizational influence processes (Porter et al., 2003) and much in line with the study in (Nielsen and Ngwenyama, 2002) because this theory has a particular focus on power and influence that cannot directly be attributed to a manager's legitimate authority. We therefore apply the theory of organizational influence processes to an ES implementation case, to analyze the key role of a corporate user representative. Different people filled the role as corporate user representative during the project, and their differences are analyzed in terms of organizational influence processes. This paper addresses the question:

Faced with the challenges of an enterprise system implementation how may we understand the corporate user representative role through the perspective of organizational influence processes?

The rest of the article is organized as follows: Section 2 presents the theory of organizational influence processes. After a description of the research method in Section 3, Section 4 describes the case. Section 5 presents the findings, and Section 6 discusses these in the broader context of ES implementation research with a particular focus on user representation and power.

2 ORGANIZATIONAL INFLUENCE PROCESSES

In the theory of organizational influence processes, there is a distinction between power and influence. Power is viewed as a resource of force, whereas influence is the actual application of that force (Porter et al., 2003, p. 3). Organizational influence processes are networks of social actions that an individual or group enacts to influence another individual or group to accomplish the originator's goals. Influence processes are found in all organizational activity and are necessary to attain what a formal organization cannot (Porter et al. 2003, p. xv).

Porter et al. (2003) divide power into two subsets: position power and personal power. Position power consists of reward power, coercive power and legitimate power, while personal power consists of referent power and expert power. Legitimate power is based on the target's belief that the influence originator has the right to issue directives, usually related to position. Referent power is based on the psychological identification of the target with the agent of influence, and an extension of this is charismatic leadership.

Dependence between organizational actors is key to the notion of power and influence (Kotter, 2003, p. 128). The more the target depends on the originator, the greater the influence the originator can have on the target. The power base may be direct or implicit and may include obligation, expertise, identification and persuasion (Kotter, 2003, p. 136).

The utilization of power is inherently situational, and an influence episode is a social event. It is the relationship between the influence originator and the target that determines the possible influence processes. There are in general nine influence tactics available: rational persuasion, inspirational appeal, consultation, ingratiation, exchange, personal appeal, coalition, legitimating and pressure (Yukl and Tracey, 2003, p. 99).

The framework of Porter et al. (2003), defines three common direct influence processes, namely: downward, lateral and upward (Figure 1). Downward influence means that the influencer is at a relatively higher organizational level than the potential target. Formal authority is important, but just as other means of influencing may often be more effective then formal authority may prove ineffective (Kerr, 2003; Goleman, 2003).

Lateral influence means that the two parties involved do not have a clear and unambiguous hierarchical difference between them. Neither party is in a position to use formal authority over the other. Potential lateral influencers are likely to use expert and reference forms of power, but rewards or punishments may also play a role. The influence target often has a clear choice in how to respond, and can be quite active in supporting or defeating an influence attempt (Cohen and Bradford, 2003; Ferris et al., 2003).

Upward influence is directed at a target in a position that is higher in the formal hierarchy than the influence agent. This limits the repertoire of influence methods and tactics that the subordinate may reasonably employ. The influence originator needs to rely more on personal bases of power such as expertise or charisma, or may need to resort to persuasion or even manipulation. Of four upward influence strategies, two are successful: ingratiator, a friendliness strategy; and tactician, a reason strategy (Kipnis and Schmidt, 2003).

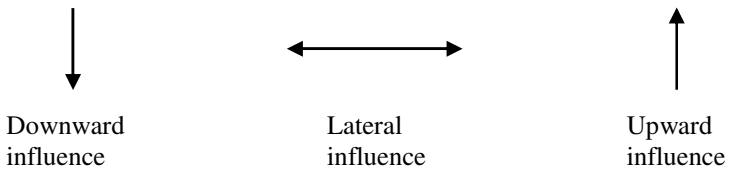

Figure 1. Three common direct organizational influence processes

3 RESEARCH METHOD

The study has been guided by Pettigrew's (1995) advice on longitudinal process research on change in a larger organizational context. The ES implementation project lasted from 2002 to 2007 and we have studied it in detail from 2005 to 2007. We used longitudinal process research to broaden the perspective on ES implementation and to further validate beyond what can be supported by immediate observations. We take Pettigrew's (1995) stance to study organizational change in context, namely that it requires multilevel analysis (i.e., varying levels of analysis) and processual analysis (i.e., analysis of sequential, temporal and historical dependencies). Crucial is also the element of time in the longitudinal study of organizational change. We applied a partial 'snowball' sampling of informants, to locate information-rich informants (Patton 1990).

The research data have been collected from important project documents and through interviews with key project staff. Table 1 summarizes the data sources used for this paper. The data sources reflect viewpoints from different levels and roles within the ES implementation project. The study thus represents an analysis of the experiences and interpretations of nine key actors in the project.

Date	Type of data
12.2005	Interviews with the two project managers, informants 1 and 2
10.2006	Initial interview with the QA/first corporate user representative, informant 3
02.2007	Follow-up interview with the QA/first corporate user representative, informant 3
03.2007	Interviews with the second and third corporate user representative, informants 4 and 5
04.2007a	Interviews with two reference group members, informants 6 and 7
04.2007b	Interviews with two steering committee members, informants 8 and 9

Table 1. Data sources

The principal data collection method was in-depth, semi-structured interviews, combined with background information from previous studies. To remain both focussed and open, a general interview guide approach was combined with an informal conversational interview, to 'go with the flow' (Patton, 1990). All interviews were audio-taped and transcribed. To increase knowledge as the interviews progressed, an interim analysis (Miles and Huberman, 1994) was performed and the interview guide evolved.

Interviews with the two consecutive project managers (12.2005) initiated this research as they both emphasized the importance of the corporate user representative. The theory of organizational influence processes was found relevant to make sense of the case data. The theory then became part of a 'sensitizing concept' (Patton, 1990, p. 216) to guide further data collection and analysis. The interviews included a definition of the three common direct influence processes (Figure 1), and the informants were asked to assess the corporate user representatives according to these.

The data analysis started with coding schemes based on the interview guides, data reduction and displays (Miles and Huberman, 1994), and continued with an inductive analysis of themes and categories occurring in the data (Patton, 1990). The researchers were not initially attending to the importance of the theory of organizational influence processes; that came gradually after the particular focus on the corporate user representative emerged. In retrospect, it is evident that the organizational influence processes played a significant role in practice and that these were understood in action by some of the organizational actors. Gradually we saw the emerging patterns of the organizational processes and were able to relate the patterns to theory.

An alteration between the different theoretical viewpoints presented above, emerged as a useful approach during the analysis of and reflection upon the case data. This is in line with qualitative data analysis as an iterative process proposed in (Miles and Huberman, 1994) and fits well with our interpretive stance.

Several iterations of analysis of the initial interviews (12.2005 and 10.2006) occurred in parallel with a search for an appropriate theoretical lens. Thus the research method followed a hermeneutical circle (Klein and Myers, 1999) until the parts of data from the initial interviews (12.2005, 10.2006) were considered consistent with the theoretical whole. This gave a sharpened focus for the remaining interviews (02.2007 through 04.2007b).

4 CASE BACKGROUND AND DESCRIPTION

Statoil[1] is the third largest exporter of crude oil in the world, with approximately 25,600 employees in 33 countries in 2006. The company operates 60% of all Norwegian oil and gas production. The company consists of seven business units, each with an IS/IT manager.

Statoil was one of the world's largest users of Lotus Notes/Domino in the 1990s (Munkvold and Tvedte, 2003). The IT architecture evolved into a partly overlapping portfolio of technologies, scattered over a number of different storage media and applications. This caused major challenges related to information retrieval, version control and information quality (Munkvold et al., 2003), as Statoil's volume of information objects grow at a rate of about 300,000 per month. In response, Statoil's corporate IS/IT service therefore launched a major Enterprise Content Management (ECM) and collaboration development program in 2002. The project objectives included collaboration and information sharing across organizational and geographical boundaries, with access to corporate information. Each employee in Statoil is attached to team sites to conduct their knowledge work and collaboration. All relevant information for a project or team is accessible to the team sites, with all documents being managed throughout their life cycles. The time frame of the project is outlined in Figure 2, and the technologies that constitute the ES are summarized in Figure 3. Taken together, the team sites, corporate-wide integrated storage and search engines provide a powerful information environment, to be accessed through a corporate portal. The case is therefore a complex ES solution, based on a combination of technologies.

The project was organized with the CIO as sponsor, a steering committee, a project group with a project manager, and a reference group with representatives from the business units (Figure 4). The reference group discussed user requirements and user acceptance. The steering committee consisted of process owners and IS/IT managers from different business units, having a customer role. The sponsor represented corporate management, was financially and commercially responsible, and chaired the steering committee. The project group was staffed by corporate services IS/IT. Vendor and other consultants were involved as needed.

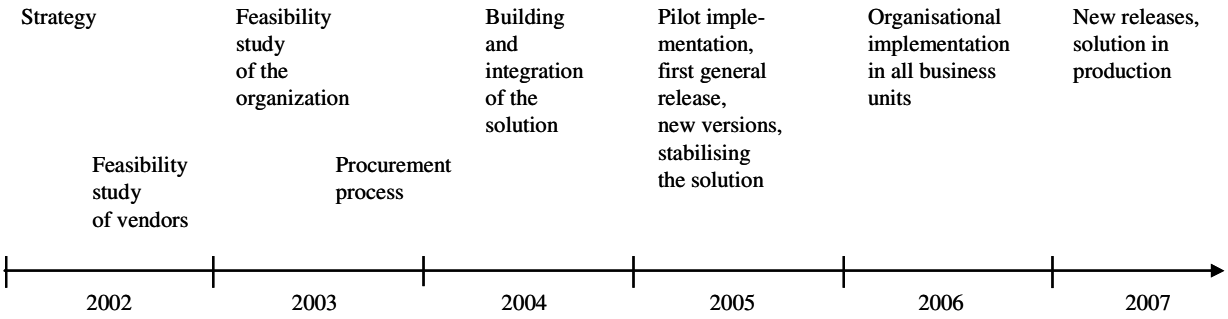

Figure 2. Time frame for the ES implementation

[1] This case study was completed prior to the merger with Hydro's oil and gas in October 2007, now known as StatoilHydro.

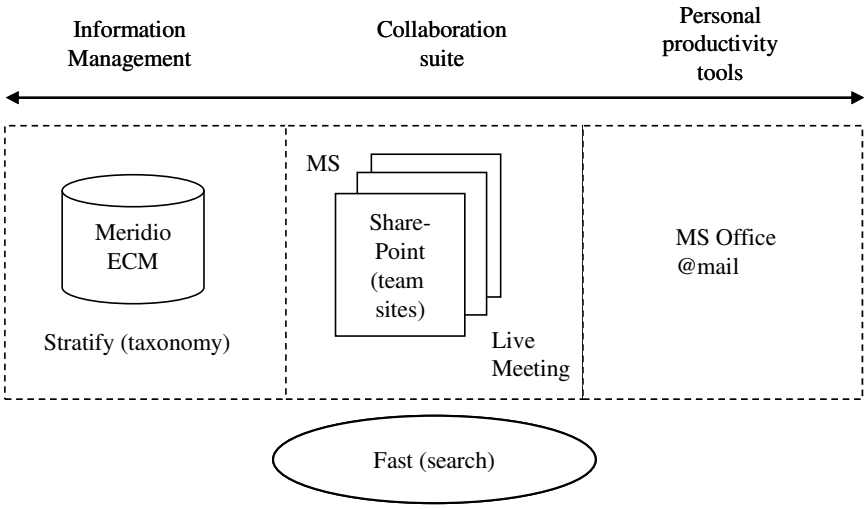

Figure 3. The set of software products chosen

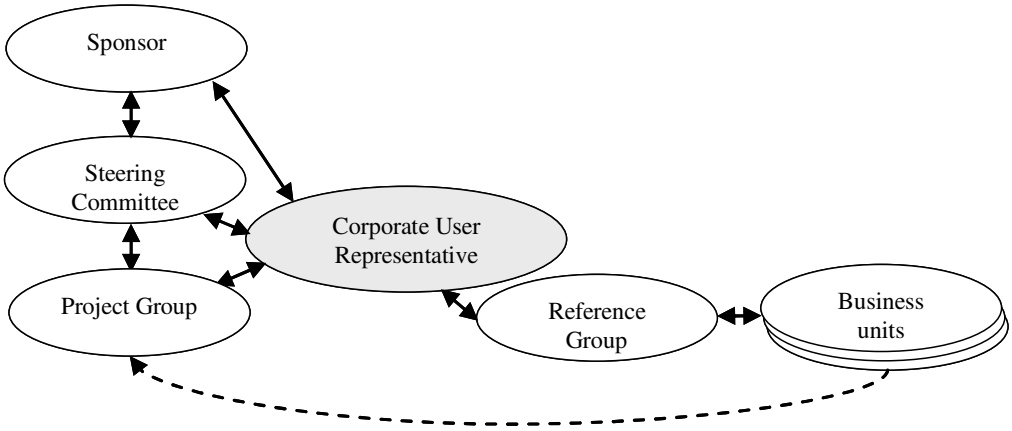

Figure 4. The context for the corporate user representative

Two project managers were involved, one from 2002 to the summer of 2005, the other since 2005. According to the two project managers, Statoil's business units were the most important stakeholders in influencing the contents of the solution, and the corporate user representative played a key role (12.2005). However, before the first real corporate user representative was appointed (i.e. representative No 2 in the following), too many strong users were allegedly voicing their opinions directly towards the project group (03.2007). This problem of the past is indicated by the dotted line in Figure 4. The involvement of users and business representatives was strong, and the use of a reference group served to obtain input and requirements from the business units and users. The overall impression was that the business units were well involved, but that varied.

4.1 The corporate user representative role

The term corporate user representative may be inadequate to describe the role in Statoil. The role is officially titled corporate user responsible, and works for the sponsor. All changes in the project are approved by the corporate user representative or the sponsor. It is important to note that the role is not an end user representative as such, but rather a representative for the business units who are the ES customers (c.f. Figure 4). To the project group, the appointment of one person to be the customer voice was considered a great advantage (04.2007b).

Because the corporate user representative is an exposed position, no ordinary user is assigned the role. It is considered a management role. "Because of extent and scope, there were no natural 'normal' user representatives to choose from … who could fill the role across the enterprise" (04.2007b). When asked whether an ordinary user could have filled this role, a reference group member replied: "I think it would have been very difficult in a project with this size". The rationale is that "you need to understand the totality. In such a complicated project you need someone who can delve into the details, but also rise above and see the totality… We all have our preferences that we fight for, and sometimes I have to admit that the common benefit – if you view the totality – means that I cannot get exactly what I want. And then the corporate user representative has to explain this to me" (04.2007a). The corporate user representative role is considered turbulent (03.2007), as the following illustrates: "Well, the project they have their agenda. They want to deliver, of course as much as possible, but they have time pressure, they have resource pressures... And the customer wants, 'Yes, is it that difficult then? Just fix it', and then you have the corporate user representative in the middle, to negotiate these positions" (04.2007a).

4.2 Individual differences between corporate user representatives

Four different individuals have been involved in the corporate user representative role, but one individual was only in for a very short time (04.2007b) and is therefore omitted in the following description. The different individuals have filled the role for natural turnover reasons. Their different backgrounds are outlined in Table 2.

	Representative No. 1	**Representative No. 2**	**Representative No. 3**
Formal role	Quality assurance responsible	Management role as corporate user representative	Management role as corporate user representative
Background	Advisor for information management and collaboration	Chief engineer of information systems	Project and product management
Project phase	Chartering, 2002-2004	Project version 1, 2005	Project version 2 and shakedown, 2006-2007

Table 2. Characteristics of the different corporate user representatives

At the outset the quality assurance responsible (No. 1) was assigned a kind of corporate user representative role, i.e. monitoring the project and reporting to the sponsor (03.2007). But at the end of the project chartering phase the need for a strong corporate role crystallized, and the steering committee decided that a management role as a corporate user representative was needed (04.2007b). The role therefore emerged, based on the project's experience (04.2007b). As a consequence, the first 'real' corporate user representative (No 2) was then appointed by the project sponsor, and mobilized a reference group consisting of representatives from relevant discipline networks and various business units representing end users (c.f. the solid lines in Figure 4). Representative No. 2 had a management background, as chief engineer of IS (03.2007), and filled the role during the most intense project phase, as version 1 was developed in 2005 (02.2007). A comment illustrates this: "but the period when [No. 2] was in office, it was pretty tough then, because it was in a way the most intense project period, well, before the solution was handed over… then I think it was of a great importance to have a very clear and crisp corporate user representative" (10.2006). As version 1 was well established, representative No. 2 entered a new position as IT manager of global business services. Representative No. 3 does not come from a comparable position as No 2 did, but is described as one who has personal power (03.2007). This personal power is exercised in an informal, open way, and is compared to a "libero" (or free, versatile type of centre back) (04.2007a).

5 FINDINGS: THE INFLUENCE OF THE CORPORATE USER REPRESENTATIVE

The corporate user representative role is in control of the customer power: ”In reality the corporate user representative can be the one who holds on to all power, in fact. For if you view it from the business viewpoint, IT is there to deliver solutions to serve the business, isn't it? And then you as a corporate user representative will have quite a lot of power.” (10.2006). This is in line with the steering committee members interviewed, that the corporate user representative may have an enormous influence in the project, if it is the right person (04.2007b). If the requirements are well anchored in the business units, the role has customer power: “The corporate user representative ought to be able to bring out, to get prioritized what is definitely most important for the business. Through that you ought to have enough power” (04.2007b).

The relationship between the steering committee and the corporate user representative can be described with words like negotiations, bargaining, struggle and disregard (03.2007). The corporate user representative had an important broker role to deal with conflicting priorities.

5.1 Different organizational influence processes for the corporate user representatives

The formal positions of the three corporate user representatives were different. Representative No. 2 was clearly positioned above the two others (02.2007).

The influence processes to the steering committee for representative No. 1 were upward, and downward to some project group members and lateral to others (02.2007). Influence tactics used were mainly rational persuasion, as well as some consultation: “Consultation, perhaps a touch of that, if there were particular issues that you knew would be topics for discussions, maybe you talked to one or two of the steering committee members in advance, eh, to be able to present [the matter] in a slightly different way” (02.2007).

According to the project managers, they needed a strong corporate user representative in the project phase, who could give direction by expressing the requirements of the business units. “As soon as we started to ‘turn on’ functionality [i.e. beyond standard], we had a greater need for acquiring … a strong and commanding user responsible, that really could put the business' requirements down on paper” (12.2005). This leads to the appointment of representative No. 2, whose management background gave him considerable position power: “What is more important than I was aware of, is the title. That I had the chief engineer title, helped tremendously. I am in a way myself, but in addition to being myself, there follows an authority and respect with that title in Statoil. As yet there is no one in corporate management that reconsiders a chief engineer's decision, which would take a lot. So when I finally say ‘okay, now I have heard what you say, we do it this way’, then in reality they regard my title as chief engineer every bit as much as [the fact] that it is NN who is corporate user representative, who made the decision” (03.2007). “And this means that I got off with play-offs. There were few play-offs concerning those decisions. So I think as a matter of fact that it has been important in the corporate user representative role, that we indeed have the right ‘standing’ in the organization to carry out that role… I got a lot free of charge with the chief engineer title” (03.2007).

Other informants confirm these viewpoints: “What may be the case is that he [No. 2] certainly has more weight in the organization, that he brings a history with him, into the role. Which may be NN [No. 3] after all is missing” (04.2007b). “It is my opinion that a person who is corporate user representative in such a project, ought to come from a reasonably solid position” (04.2007b). “When it came to NN [No. 2], he was in the process owner's staff, IS/IT, who was both sponsor and employer, so he was positioned higher in the organization; and by virtue of that he had a totally different power to prevail as a corporate user representative” (02.2007). “It is obvious that his words were really decisive in many contexts... he had power to apply pressure if he thought a matter was important… well, he [No. 2] was positioned relatively high in the hierarchy, both as regards respect from the

business and respect from the project… others need more diplomatic and a little by hook or by crook; that is, your word is not decisive, as with NN" [No. 2] (10.2006).

This power includes a pre-history in the enterprise (03.2007). Whereas position power was considered important by the corporate user representatives themselves, the steering committee members did not perceive position to be important (04.2007b). Representative No. 2's influence processes to the steering committee were lateral, and downward to the project group and reference group (03.2007). Influence tactics used were mainly rational persuasion, and consultation, although some situations included pressure: "Facing the project group I once in a while ended in a situation where I had to tell them: I hear what you say, but I am he who decides" (03.2007).

Representative No. 3 missed some of the position power that No 2 had (04.2007b), and was on a comparable position to representative No. 1: "but I think he has somewhat the same position that I had… he came from the same level in the organization too" (02.2007). Commenting on him, representative No. 2 stated: "But NN has a good share of 'personal power', and he is very clever, so he certainly handles the challenge better than the majority… But it confirms that… I do not think this [political skill] is enough… perhaps you get unnecessary lots of challenges, if you have too many relations of that kind [upward]" (03.2007). According to other informants, his influence processes to the steering committee were upward, there was a mixture of lateral and downward influence to the project group, and downward to the reference group (03.2007). According to representative No. 3's own judgment, there were lateral influence processes to some steering committee members, downward influence to the project group, and lateral influence to the project manager (03.2007). All the influence tactics were used, according to this corporate user representative. However, the steering committee members referred to consultation as the main influence tactic (04.2007b).

6 DISCUSSION

Based on the experiences of this case, the corporate user representative emerged as an important role. This case shows that corporate user representatives are particularly important in ES implementation projects, to specify business requirements. The role potentially controls an important resource, the business' acceptance of the system.

Although power is a messy and elusive concept (Jasperson et al., 2002), organizational influence processes (Porter et al., 2003) is a way to focus on the relative power of users in the dialogue with designers. As the corporate user representative role was analysed by means of organizational influence processes, important differences were found between the individuals filling the role. Through our analysis we have found that organizational influence processes account for important differences between the corporate user representatives in this ES implementation.

6.1 Organizational influence processes and corporate user representatives

Table 3 summarizes the directions of influence vis-à-vis steering committee, project group and reference group. Corporate user representative No. 2 had a higher formal position than the others, and according to Markus (1983) this gives legitimacy to use power resources. In terms of organizational influence processes he had lateral and downward influence processes and therefore avoided the problematic upward influence. This is line with Porter et al., (2003), to avoid upward influence and rather attempt lateral influence. This empowers the corporate user representatives, and is described in different ways by the informants: (i) a history in the organization, (ii) the right standing in the organization, (iii) he performed a management function, (iv) he avoided play-offs, (v) powerful and directing, considered beneficial by the project manager.

Although personal power is considered important by informants in this case, position power is necessary. Position power was not considered important by steering committee, but emphasized by all the others. Why position power was not considered important by steering committee is not clear, one explanation may be the influence tactics used. Of the nine influence tactics available (Yukl and Tracey, 2003), the corporate user representative mainly applied rational persuasion, and some consultation. None of these imply pressure.

Vis-à-vis	**Representative No. 1**	**Representative No. 2**	**Representative No. 3**
Steering committee	Upward influence	Lateral influence	Upward influence
Project group	Lateral influence	Downward influence	Lateral/ Downward influence
Reference group	Lateral influence	Downward influence	Lateral/ Downward influence

Table 3. The organizational influence processes of the corporate user representatives

Due to a lower formal position, corporate user representative No. 1 had to rely more on diplomatic skills, so a negotiator role was important. Corporate user representative No. 2 could more dictate from his position. Corporate user representative No. 3 also had to rely on personal skills, including his considerable personal power. This may also be an explanation for the wide spectre of influence tactics he applied. Although political skill (Ferris et al., 2003) is considered important, it may not be sufficient if there are upward influence processes. In order to function well vis-à-vis project group and steering committee, upward influence processes are to be avoided. Lateral influence requires a sufficiently high formal position. In addition to influence processes, personal characteristics such as the ability to listen are important for the role (Nordheim, 2008).

A criticism against corporate user representatives 2 and 3 was that they made too many decisions themselves. The organizational influence processes is not a likely explanation for this, since the two had different formal positions. Personal characteristics may be an explanation, possibly combined with the downward direction of influence to the reference group. Although representative No. 2 came from a position high enough to avoid upward influence processes, there was no indication in the data that the role was perceived as advocating management goals. In view of organizational influence processes, the appointment of ordinary users to the role may be risky. If they have to rely on upward influence processes, the risk of not being heard is considerable. Due to the enterprise-wide scope of an ES project, a lower proportion of affected users have opportunities to participate (Markus and Mao, 2004). In this ES context, the corporate user representative was not a user representative as such. S(he) represented the business units. End users from the different business units were represented in the reference group. User representation was therefore aggregated at two levels: the reference group, and the corporate user representative (c.f. Figure 4). One could argue that the role restricted end user participation, in the sense that user input was structured and prioritized. Reference group members did not always feel they were being heard. But this also depends on the composition of the reference group, as some reference group members were said to dominate. A strengthened reference group, internally balanced in terms of influence processes, may therefore have reduced the problem.

Organizational influence processes also raises the issue of the role as a change agent. Although No. 2 was an IS specialist, he was not a change agent according to a traditional IS model (Markus and Benjamin, 1996). Change agentry was rather a combination of some aspects of the facilitator model and the advocate model (ibid). Representative No. 2 established the reference group, by requesting business units to appoint their representatives. This implies a change agent in line with Markus and Mao (2004), designing and executing participation opportunities for stakeholders.

Organizational influence processes were in this case found useful as a theoretical lens to analyze important individual differences regarding the application of power by three different corporate user representatives. Due to the complexity and scope of an ES, the corporate user representative role requires an individual coming from a high enough formal position to avoid upward influence processes. This perspective is important, since value conflicts occur between stakeholders in ES

implementations (Allen, 2005), and there is a need for the management of user participation (Besson and Rowe, 2001) in ES projects. In view of organizational influence processes, the corporate user representative role should avoid the problematic upward influence, and this is an important criterion to look for when such a role is to be filled.

6.2 Implications for research

Our findings also indicate that the formal position of the individuals of the reference group needs careful consideration. The reference group is a vital single point-of-contact in each business unit, and could preferably be a balanced group to match the corporate user representative. To ensure lateral influence processes within the reference group appears important, but this needs to be explored.

7 CONCLUSION

Enterprise system implementation is a complex effort on a large scale. Based on the experiences of this case, the corporate user representative emerged as a critical role. Analyzed in terms of organizational influence processes, the case brings out important differences between the individuals filling the role.

At the outset a user representative (No. 1) had to perform upward influence processes due to a lower formal position. This impeded the responsibilities of the role. The corporate user representative (No. 2) appointed at the critical project phase, avoided the challenging upward influence processes. His formal position implied lateral influence processes to the steering committee and downward influence processes to the project group. This enabled clear directives for the project manager, who appreciated a powerful and directing corporate user representative. Based on the findings of this case, we therefore argue that a corporate user representative should be considered a management function, with adequate formal position to avoid upward influence processes.

References

Allen, J.P. (2005). Value conflicts in enterprise systems. Information Technology & People, 18(1): 33-49.

Baskerville, R. and S. Smithson (1995). Information technology and new organizational forms - Choosing chaos over panaceas. European Journal of Information Systems, 4(2): 66-73.

Besson, P. and F. Rowe (2001). ERP project dynamics and enacted dialogue: perceived understanding, perceived leeway, and the nature of task-related conflicts. SIGMIS Database, 32(4): 47-66.

Cohen, A.R and D.L. Bradford (2003). Influence without authority: The use of alliances, reciprocity, and exchange to accomplish work. In Organizational Influence Processes (Porter, L.W., H.L. Angle, R.W. Allen. Eds.), New York, M. E. Sharpe: 384-394.

Ferris, G.L., P.L. Perrewe, W.P. Anthony, D.C. Gilmore (2003). Political skill at work. In Organizational Influence Processes (Porter, L.W. et al. Eds.), New York, M. E. Sharpe: 395-406.

Goleman, D. (2003). What makes a leader? In Organizational Influence Processes (Porter, L.W., et al. Eds.), New York, M. E. Sharpe : 229-241.

Grover, V., A.L. Lederer, R. Sabherwal (1988). Recognizing the politics of MIS. Information and Management, 14(3): 145-156.

Howcroft, D. and B. Light (2006). Reflections on issues of power in packaged software selection. Information Systems Journal, 16(3): 215-235.

Jasperson, J.S., T.A. Carte, C.S. Saunders, B.S. Butler, H.J.P. Croes, W. Zheng (2002). Review: Power and information technology research: A metatriangulation review. MIS Quarterly, 26(4): 397-459.

Kerr, S. (2003). On the folly of rewarding A while hoping for B. In Organizational Influence Processes (Porter, L.W., et al. Eds.), New York, M. E. Sharpe: 142-150.

Kipnis, D. and S.M. Schmidt (2003). Upward-influence styles: Relationship with performance evaluations, salary and stress. In Organizational Influence Processes (Porter, L.W., et al. Eds.), New York, M. E. Sharpe: 446-461.

Klein, H.K. and M.D. Myers (1999). A set of principles for conducting and evaluating interpretive field studies in information systems. MIS Quarterly, 23(1): 67-93.

Kling, R. and S. Iacono (1984). The control of information systems developments after implementation. Communications of the ACM, 27(12): 1218-1226.

Kotter, J.P. (2003). Power, dependence, and effective management. In Organizational Influence Processes (Porter, L. W., et al. Eds.), New York, M. E. Sharpe: 127-141.

Markus, M.L. (1983). Power, politics, and MIS implementation. Communications of the ACM, 26(6): 430-444.

Markus, M.L and R.I. Benjamin (1996). Change Agentry - The Next IS Frontier. MIS Quarterly, 20(4): 385-407.

Markus, M.L and J.-Y. Mao (2004). Participation in development and implementation - Updating an old, tired concept for today's IS contexts. Journal of the Association for Information Systems, 5 (11-12): 514-544.

Markus, M.L. and C. Tanis (2000). The enterprise system experience - From adoption to success. In Framing the domains of IT management: projecting the future through the past (Zmud, R.W. Ed.), Cincinnati, Ohio, Pinnaflex Education Resources: 173-207.

Miles, M.B. and A.M. Huberman (1994). Qualitative Data Analysis: An Expanded Sourcebook. Thousand Oaks, Calif., Sage.

Munkvold, B.E. and B. Tvedte (2003). Implementing a portfolio of collaboration technologies in Statoil. In Implementing Collaboration Technologies in Industry (Munkvold, B.E. Ed.), London, Springer: 81-107.

Munkvold, B.E., T. Päivärinta, A.K. Hodne, E. Stangeland (2003). Contemporary issues of enterprise content management: The case of Statoil. In Proceedings of the 11th European Conference of Information Systems (ECIS), Naples, Italy.

Nielsen, P.A. and O. Ngwenyama (2002). Organizational influence processes in software process improvement. In Proceedings of the 10th European Conference of Information Systems (ECIS), pp 208-218, Gdansk, Poland.

Nordheim, S. (2008). Corporate User Representatives and the Dialectics of Enterprise Systems: A Quest for Social Actors with Political Skill. In Proceedings of the 41st Hawaii International Conference on System Sciences (HICSS), Big Island, Hawaii.

Nordheim, S. and T. Päivärinta (2006). Implementing enterprise content management: from evolution through strategy to contradictions out-of-the-box. European Journal of Information Systems, 15(6): 648-662.

Patton, M.Q. (1990). Qualitative evaluation and research methods. Newbury Park, Sage.

Pettigrew, A.M., (1995). Longitudinal field research on change. In Longitudinal Field Research Methods: Studying Processes of Organizational Change (Huber, G.P. and A.H. Van de Ven. Eds.), Sage Publications, Thousand Oaks, California.

Porter, L.W., H.L. Angle, R.W. Allen (2003). Organizational Influence Processes. 2nd ed. New York, M. E. Sharpe.

Robey, D. and D. Farrow (1982). User involvement in information system development: A conflict model and empirical test. Management Science, 28(1): 73-85.

Sedera, D., G. Gable, C. Taizan (2004). Measuring enterprise systems success: the importance of a multiple stakeholder perspective. In Proceedings of the 13th European Conference on Information Systems (ECIS), Turku, Finland.

Skok, W, and M. Legge (2002). Evaluating enterprise resource planning (ERP) systems using an interpretive approach. Knowledge and Process Management, 9(2): 72–82.

Yukl, G. and J.B. Tracey (2003). Consequences of influence tactics used with subordinates, peers, and the boss. In Organizational Influence Processes (Porter, L.W., et al. Eds.), New York, M. E. Sharpe: 96-116.

Appendix B. Interview guides

The interviews and the interview guides were in Norwegian. They have been translated to be included in this appendix, which is organized as follows. The interview guides for the longitudinal case study are presented in chronological order, one for each of the three data collection and analysis periods. Finally the interview guide for the mini cases is presented.

1. Interview guide from the first data collection and analysis period

Introduction

0. Background information about the study and my thesis work, and is it ok to record the interview?
1. What is your role in the ECM project?

Enterprise content management

2. What do you mean by "ECM system"?

3. What kind of software packages are related to ECM?
(i.e. for each of the solution alternatives: a)As-is with CMM b)As-is with ECM and MS Office c)New ECM and collaboration suite)

Customization

4. What does the word "customization" mean to you? Do you use other concepts? (e.g. building publication workflows, is that customization?)

5. What are the expected customization needs related to ECM in Statoil?
(i.e. for each of the solution alternatives: a)As-is with CMM b)As-is with ECM and MS Office c)New ECM and collaboration suite)

6. What kind of / level of customization does each of these customization needs require?

7. If there will be customization, how will this customization be done? (e.g. choosing / constructing / altering?) (i.e. for each of the solution alternatives: a)As-is with CMM b)As-is with ECM and MS Office c)New ECM and collaboration suite)

8. What are the greatest expected customization challenges related to ECM in Statoil?

9. How did you come up with the expected customization needs related to ECM in Statoil?

10. How are you able to evaluate your needs for customization, now in advance?

11. Who will be doing the customization?
(i.e. for each of the solution alternatives: a)As-is with CMM b)As-is with ECM and MS Office c)New ECM and collaboration suite)

Thank you, further contact etc.

2. Interview guide from the second data collection and analysis period

(Note that not all the questions here were asked to all informants. The questions were selected according to the informant's role, and some of the questions were used in follow-up interviews with key informants).

Introduction
Background information about the Statoil case study and my role, and is it ok to record interview?

The request for proposals (RFP) process
1. Can you tell me about the RFP phase?
2. What were the decisive arguments when selecting the vendors?

Context, important events
3. Have there been major events since the project started, which have had great impact
a) on the choices made? b) on how the project developed?
(i.e. were these special incidents in the project that had influence on the development of the project?)

The "out-of-the-box" experience
4. Can you tell about the cases you gave to the potential vendors during the RFP process?
5. What was the significance of the "out-of-the-box" experience? (i.e. as a basis for the requirements)
6. The sponsor became very active in the project for a time period after the solution scenarios, what happened and why?

Mutual adaptation
7. The need for adaptation: Was the need for system adaptations as expected?
8. To what extent has Statoil made organizational adaptations to the chosen solution?

Custom components (the process)
9. There was a strong prioritization of custom components, can you tell about the process?
10. Was there a lot of "give-and-take" to arrive at these?
11. Were there groups with conflicting interests?
12. Where did sponsor get his expectations of software "out-of-the-box" from?
13. How do you view the relationship between the sponsor's mindset and the custom components?
14. How was the possible tension between the sponsor's mindset and the custom components handled? (Did it sway back and forth between standardization/out-of-the-box and special solutions in the project? Were there negotiations or contradictions or something else…?)

Contradictions
15. Were there any possible tensions between standard software and Statoil's needs?
16. Were there any possible contradictions in the project?
17. Have there been any conflicts in the project?
18. Has the project had any plans for identifying and managing possible conflicts that might occur? (And if any plans: have these plans affected the project in any way?)

The nature of the project phases

19. In your opinion, are the infrastructure issues to be seen as a technological imperative? (give quotes to illustrate this view…)
20. In your opinion, are the user experience issues to be seen as an organizational imperative? (give quotes to illustrate this view…)
21. In your opinion, is the process leading to the custom components specification emergent, with complex social interactions and contradictory preferences? (give quotes to illustrate this view…)

Feedback on my initial interpretations

22. A discussion of my figure that illustrates the development of contradictions in the project: May I get some reaction to this figure, which is my way of thinking out loud… if you have any comments?
23. Do you have any comments on the major contradiction found?

Thank you! Who else should I talk to about these questions?

2.1. Additional questions to the previous and current project managers

24. Which stakeholders or groups of stakeholders do you consider to be the most important ones in the project (i.e. as regards influence)?

35. If we look at the strategy to use standard software as-is, and the need to develop custom components, how do you view the relationship between the two?

36. What do you consider the most important tensions or contradictions within the C@S project?
(If tensions: what were these about? Were there other tensions, if you look beyond the project? Were there tensions from the beginning?)

37. May I get some reaction to this figure (Figure 5 in publication 3): The dialectic of adaptation in Statoil, contradictions based on issues after the out-of-the-box experience…

38. I wonder about the different groups or stakeholders. I understand from some informants that in the prioritization of custom components, you had some contradictions between different groups or stakeholders concerning what to prioritize and not. Can you tell me about that process, what were the constellations there?

39. A discussion of whether the 4 motors of change applied to this project and if so, how they developed… (Based on Van de Ven and Poole's figure 1).

3. Interview guide from the third data collection and analysis period

(Note that the following abbreviations are used here: C.U.R is the corporate user representative, S.C is the steering committee, P.G is the project group, R.G is the reference group, C@S (collaboration at Statoil) is the name of the project).

Introduction
About me and the study. Exploring the influence issues for the C.U.R role in the dialectic of adaptation. Consent to record the interview?

The informant
Position in the line organization
Position in the project, and for how long

The corporate user representative role

1. The role as C.U.R in Statoil: what does it imply, in coarse features?
2. What do you think is important to fill such a role?
   (to be a good C.U.R in an ES implementation project)
3. Why is the C.U.R role used instead of an ordinary user as a representative?
   Is it important that the C.U.R role is a management position in such a project?
4. The C.U.R has been changed a couple of times in the project.
   Who took the initiative to this, and why do you think it was done?
   What do you think was the most important result of this change?

Political skill
Show the definition of "political skill" (Porter et al. p 395-6).

5. Is "political skill" important for a C.U.R?
   Was the P.G dependent on the C.U.R to get the business' acceptance?
   Was the S.C dependent on the C.U.R to get the business' acceptance?
   (c.f. Customer power: "relations to the client", Porter et al. p 367)

Different individuals who filled the role
3 different persons had the C.U.R role in C@S. Show influence figure (figure 1 in chapter 2).

6. How do you assess NN / NN / NN's formal position in relation to the individuals in the P.G and S.C? (i.e. lateral influence or upward influence?)
   (i.e. in your opinion, was there a difference between the formal authority or position for C.U.R No. 1, 2, 3?)

3.1. Additional questions to the former and current corporate user representatives on organizational influence processes

7. The corporate user representative role and influence. How do you in general view the influence of the C.U.R role in a Statoil project?
   In your opinion: you who were C.U.R in C@S, did you act as strong pushers / change agents in the project?
8. What will you say is the basis for your influence as C.U.R?
   Formal position? (if so: specify… e.g. position power: reward/coercive power, legitimate/formal authority?)
   Personal characteristics / attributes? (if so: specify… e.g. personal power: referent/charismatic, expert power)?

Relations with the project group

Show influence figure (figure 1 in chapter 2).

9. How was your formal position compared to the members of the P.G?
   (i.e. did you as C.U.R have a lateral or vertical communication to the P.G?)
   In relation to the P.G – were you in such a position that you could dictate some choices? What did you have to do to try to get a breakthrough for an idea?

Relations with the steering committee

10. How was your formal position compared to the members of the S.C?
    (i.e. did you as C.U.R have a lateral or vertical communication to the S.C?)
11. In relation to the S.C – were you in such a position that you could dictate some choices, or what did you have to do to try to get a breakthrough for an idea?
12. S.C had a customer role, so why were there a few contradictions between the S.C and the C.U.R?

Relations with the reference group

13. What kind of hearing / consultative bodies did you use? (R.G /other network?)
    What is the role of the R.G? (i.e. what did you use the R.G for?)
14. As you now view it, should the C.U.R role had been strengthened in any way in any of the project phases? Should something have been done differently?

Influence tactics

Show: "nine influence tactics" (Porter et al. p 99).

15. Which of these influence tactics were most important for you in relation to
    (i) P.G and (ii) S.C?

3.2. Additional questions to the steering committee members

The dialectic of adaptation and the corporate user representative role.

Show Figure 5 (in publication 3)

16. Were there any tensions between the C.U.R and the S.C as regards the extent of adaptation or need for adaptation?
    If so, how were the tensions handled?
    If one knew of any contradictions in advance, could ideally such tensions be handled differently?
17. Can you say anything about groups that had contradictory interests?

3.3. Additional questions to the reference group members

18. There have been different individuals in the C.U.R role, what is your view of them in the C.U.R role?
19. To what extent will you say the C.U.R role has represented the business?
20. What is your view of the formal position of the C.U.R role in the hierarchy?
21. Can you tell me: how is the interaction between you and the other R.G members?
22. And how is the interaction between the R.G and the C.U.R?
23. How does the C.U.R role ensure that it is the business units' interests that are promoted?
24. Have you as a R.G member had any conflicts of prioritization with other R.G members in relation to the C.U.R?

Thank you…! Who else should I talk to about these questions?

4. Interview guide from the mini cases

Introduction

0. Information about me and the study. Is it ok to record the interview?

Demographics

1. The role of the informant
2. The company, the product, the customers

Customization

3. What is the business idea regarding customization of this product?
4. What are the different types of adaptation with this system? (i.e. classification and percentages in practice?)
5. Are there differences between customers (public/private sector, size etc)?
6. What is the extent of configuration and programming at typical installations?

Commonality/variability

Present the software engineering concepts of commonality and variability…

7. What are your thoughts about commonality and variability as applied to your product?
8. The concept of variability in this context: how is it understood in this context?
9. What are the different types of variability?
   What are potential drawbacks of the different types of variability for the customers?
10. Can you describe the extent to which the different types of variability is predefined or not?
11. Your strategy on commonality versus variability, i.e. how do you draw the line between commonality and variability?

Dialectics

12. I have a quotation that I would like your comments on: "The real innovation is the mutual adaptation between the information system and the organization". What are your thoughts on this?
13. If we think of a standard software package (or solution) and a rather unique organization, the two may to some extent be in a contradiction to each other. And you may do anything from adapting the organization to adapting the software. Do you have any reflections on that as a contradictory relationship?
14. To what extent is there applied any pressure on the customer to adapt to the system? (i.e. so that the system only needs to be configured)

Thank you…! Who else should I talk to about these questions?