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A Preliminary Evaluation of an Enterprice-wide eCollaboration Solution

A Case Study in Statoil

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Preface

This thesis presents the work conducted by two master students in the final part of the Master programme in Information Systems at Agder University College in Kristiansand, Norway.

The aim of the research conducted has been to explore the implementation of an enterprise-wide eCollaboration solution and present both individual and organisational effects related to the implementation.

We would like to thank Anne Kleppe in Statoil who has been our contact person in Statoil during the project period and Hans Hysing Olsen who has been present on some of the meetings to give us valuable information. We would also like to thank the 13 respondents who willingly provided us with in-depth information about their experiences with the eCollaboration solution.

At last we would especially thank Tero Päivärinta and Bjørn Erik Munkvold for very helpful guidance throughout the entire project period.

Kristiansand, May 31st, 2006

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Summary

Based on the World Wide Web and the internet new possibilities have emerged for organisations in terms of collaboration. Organisations invest heavily in collaborative systems to be able to collaborate more efficiently both internally and externally.

There is increasing research in the area of collaboration technologies. By focusing on group interaction, collaborative technologies pose new opportunities to organisations. The potential benefits including more efficient and better collaboration, cost savings by communication across organisational boundaries and improved possibilities for decision making. However, new opportunities raise new challenges. Prior research suggests that obtaining benefits from information systems is not only dependent on the technology itself, but very much dependent on organisational factors.

The aim of our study was to explore effects obtained by an enterprise-wide eCollaboration solution, both negative and positive, and provide lessons learned and future guidelines to how an organisation may obtain the potential benefits an eCollaboration solution may provide.

In the literature review we provide an introduction to collaboration technology. The review includes different aspects of collaboration technology. Based on the time-space taxonomy first presented by DeSanctis and Gallupe (1987) we present different types of collaboration technologies, before we introduce possible benefits and areas were collaboration technology may differ from traditional information systems. We address several factors that influence collaboration technology implementations through a taxonomy developed by Munkvold (2003). The factors are divided into general factors and technology specific factors to cover the entire solution to its full extent. Further we provide a historical perspective on IT benefits realisation by illustrating several closely related models for the assessment of IT investments. At last we present one emerging framework of IT investment benefits realisation; namely Benefits Management.

This project has been conducted in Statoil, a large Norwegian oil company situated with head quarter in Stavanger, Norway. The research has consisted of document analysis of central corporate documents related to the solution and qualitative interviews. The document analysis was conducted in order to have a good foundation for forming the interviews. In addition, 13 interviews were conducted, transcribed, categorised and analysed.

Our findings were discussed in light of prior research done on collaboration technologies. We found several issues that have influenced the adoption process and roll-out of the collaboration solution. We found that there has been an increased focus on collaboration and that the solution has had a definite impact related to the employees' work processes. Most of the factors that influenced benefits realisation were closely related to the influencing factors highlighted in the literature review. Our research supports that organisations do not emphasise support activities for the implementation project to a large enough extent, something that in terms affect the realisation of benefits. However, by implementing functionality that provides a more "open" environment our research found that an increased focus on the collaboration process and certain roles are necessary to be able to realise the potential benefits, and the increased focus need to be maintained due to a timely dependent benefits realisation process. The tools that are most likely to be adopted easily are the tools for individual production and coordination. The tools that require group interaction and collaboration to produce the outcome are due to a higher threshold of learning and disparity in work and benefit not that easily adopted. These tools require more attention and initiatives should be initiated to attain

the possible effects. Shortly summarised our research found that there are many intervening factors that effect whether organisations obtain the potential benefits from their investments or not, and that there should be an increased focus towards activities to support the implementation project.

During our analysis we found some interesting areas of research which can build on this report. Concerning the qualitative view of this research it will be interesting to use our results to conduct a quantitative study involving more participants to get a more definite view of how successful the implementation has been. It would be interesting to explore the usage of a common archive of information storage and retrieval and how this more definitely affects individual users, and the organisation as a whole. With the implementation of a powerful intranet search engine it would be interesting to investigate users search behaviour and what users emphasise when searching the intranet; in general their subjective behaviour towards intranet searching. At last, the early phase of this research made it difficult to investigate how possibilities for external collaboration affect the organisation, so it may be interesting to emphasise this in future research.

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1 Introduction

In most organisations today, collaboration among employees constitutes as a vital part of their daily work, and most organisations have implemented some sort of information technology to support this collaboration. In large organisations where there are several business units spread at different locations, even different continents, it gets vital that the people at these different locations are able to communicate and collaborate without having to travel back and forth all the time. The solution to this is implementation of collaboration technologies.

The term collaboration technologies are used to describe technologies which allow users to work together, independent of time and distance (Midwinter and Sheppard, 2000). Typical examples of such technologies can be video and desktop conferencing, knowledge and workflow management systems and electronic meeting systems (Munkvold, 2003). The emergence of collaboration systems is closely related to the rise of the World Wide Web, the collaboration tools also use the Internet to facilitate the collaboration to the users.

Evaluation of investments in collaboration technologies as well as other information technologies is difficult because of the delay between the implementation and the realisation of benefits (Al-Tameem and Wheeler, 2000). To measure tangible benefits, methods like Return on Investments, Net Present Value, Internal Rate of Return and Payback Period are often used. These methods are best suited to measure the value of simple IT applications, such as transaction processing and office automation systems (Martinson et al. 1999). The problem is that these kinds of methods are not suited to evaluate the newer generations of information systems. This is partly because intangible benefits as well as potential risks often are ignored. This is particularly important with technologies concerning collaboration and decision making because the effects can seldom be measured directly in financial terms.

Formal methodologies for pre- and post-implementation are important for evaluation purposes, but they are insufficient in terms of ensuring that the benefits required are realized and delivered to the organisation (Lin and Pervan, 2003). Despite of this there have been relatively less formality applied to managing and realizing the benefits of IS/IT investments. Seddon et al. (2001) illustrates this challenge with a survey that identifies and measures benefits as the most difficult issue in evaluating IT. They identified six major reasons why organisations fail to monitor whether the project benefits of IS/IT are being realized.

- It is difficult to assess benefits after a project has been implemented
- It is not necessary as the project was implemented according to the plan
- It is too costly to undertake the proper post-implementation reviews on benefits
- Many organisations tend to give very little attention to the intangible benefits when decisions are made
- Many organisations have poor IS/IT adoption practices
- It is against many organisations' culture to act as both the watchdog and implementer for benefits delivery.

When the project benefits are hard to measure in financial terms, it is especially important for the organisation to have a good understanding of the potential benefits of the implementation project to achieve realisation of these benefits (Lederer and Mirani, 1995). Benefits Management is a framework suggested as a way to evaluate and realise the benefits of an investment. Using the benefits management process makes it easier to organise and manage

the information systems development so that the potential benefits from the use of information technology are actually realised (Ward and Murray, 1997).

1.1 Research question

The eCollaboration Strategy makes the basis for the implementation of the new solution in Statoil. Based on evaluation of previous collaboration tools and Statoil's need for a solution that provide the opportunity for reusable and traceable content, they formed eight strategic goals to be realised by the new solution. These goals are reformulated in the project handbooks as effect goals. The effect goals describe the expected benefits from the implementation (Statoil, 2002; Statoil, 2004).

The "roll-out" of the collaboration solution started in 2004, and the project was planned to be finished in 2006. This means that some of the users have just started to use the solution, and this makes it difficult to perform a full evaluation of the effects. According to prior research done on enterprise-wide IS implementations many benefits are more likely to occur a while after implementation. But even though all the benefits probably not will be realised at this point of time, Statoil want an indication on the present effects, and what they can do to ensure that further benefits from the implementation can be realised. Based on the situation in Statoil and their demands combined with previous theory on evaluation of eCollaboration, we have formed the following research questions:

- To what degree does the implemented eCollaboration solution in Statoil correspond to five initial effect goals?
- Can further actions be initiated to ensure future benefits realisation?

2. Collaboration technologies

Collaboration technology is a mutual term that binds together a lot of different technologies within the area of collaborative research. Technologies to allow users to collaborate together, independent of distance, have been available for a number of years, but initially the processes remained unchanged, so the need for the new technology was limited (Midwinder and Sheppard, 2000). The emergence of collaboration technologies is by many researchers seen as an effect caused by the explosive growth of the Internet and the web in the early 90's. Munkvold (2003) defines collaboration technologies as all types of information and communication technologies that enable collaboration at various levels, from two persons co-authoring a document to interorganisational collaboration where several companies are engaged in common tasks. Typical examples of collaboration technologies are video and desktop conferencing, knowledge repositories, workflow management systems, online meeting schedulers and electronic meeting systems (Munkvold, 2003).

A term that is often used on collaboration technologies are the term electronic collaboration (eCollaboration). There are several types of electronic collaboration and it seems problematic to make a definite distinction among them. Most researchers therefore use more or less general definitions of the term (Kock, 2005; Pinnosault and Kramer, 1989; Briggs et al., 2002). We have drawn out three definitions of the term eCollaboration from the literature.

"Collaboration is collaboration among individuals engaged in a common task using electronic technologies" (Pinnosault and Kramer, 1989)

"eCollaboration is an umbrella term which comprises of several other closely related fields, commonly known as computer mediated communication (CMC), computer supported – cooperative work (CSCW), groupware, group support systems (GSS) and collaboration technologies"(Kock, 2005).

"eCollaboration or electronic collaboration is the practice of using collaborative technologies to support groups creating shared understanding and work to attain their goals" (Briggs et al., 2002)

2.1 A Taxonomy for Collaboration Technologies

There is a broad range of collaboration technologies and applications. This has resulted in several taxonomies and classification frameworks. The most influential of these has been the time-space taxonomy first presented by DeSanctis and Gallupe (1987, cited by Munkvold, 2003). As illustrated in figure 1 the matrix organizes collaboration technologies into a four – cell matrix, according to the time and geographical space of the collaborative interaction (Munkvold, 2003).

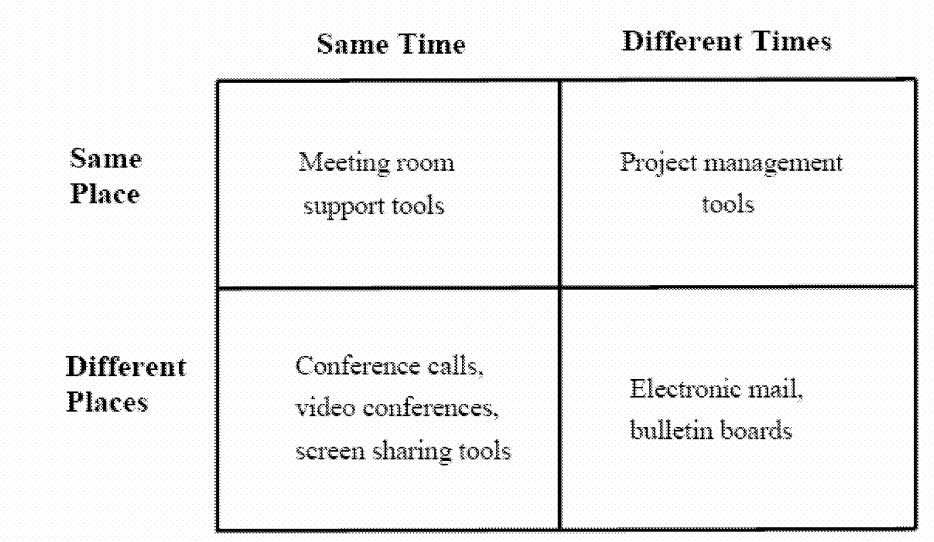

Figure 1 - The time - space matrix for classifying collaboration technology

In the matrix same time is similar to synchronous interaction, and different time relate to asynchronous interaction. Grudin and Poltrock (1997) have extended this time – space matrix to include two different types of different times and different place rows. These are different time but predicable, different time and unpredictable, different space but predicable and different place and unpredictable. The extension of the time-place matrix will not be discussed further in this report.

In addition to the time-space model, Munkvold (2003) has included two additional categories to meet the requirements of continuous developments within the area of collaborative technologies. These are meeting support technologies and integrated products. The meeting support technologies that in general involve electronic meeting systems and integrated products that include collaboration product suits, integrated team support technologies and e-Learning technologies.

As illustrated in the time-space matrix above, it exist a wide range of different collaboration technologies. According to Munkvold (2003) these can be divided into communication technologies, shared information space technologies, meeting support technologies, coordination technologies and integrated products.

2.1.1 Communication technologies

Communication technologies include both asynchronous and synchronous technologies that support interpersonal communication across geographical distance (Munkvold, 2003). The most widespread communication technology to this date is e-mail. E-mail provide one-to-many communication, and in addition plays an vital role in providing messaging services for coordination tools such as workflow, and calendaring and scheduling. Instant Messaging (IM) is another communication technology that uses synchronous communication. IM makes it possible to communicate with others in real-time, and it is always possible to see whether colleagues are online or not. In addition to e-mail and IM audio conferencing and video conferencing are available communication technologies.

2.1.2 Shared information Space Technologies

Shared information space technologies is the common term used for technologies supporting collaborative work related to the production and manipulation of information objects such as document and drawings, and for creating virtual interaction spaces such as electronic bulletin boards and discussion lists. This category includes both synchronous and asynchronous technologies (Munkvold, 2003). Document management systems that support the creation and electronic archiving of documents, web – based team/project rooms that offer free creation and use of document repositories within a limited space, data conferencing and electronic bulletin boards are definite examples of shared information space technologies.

2.1.3 Coordination technologies

Coordination can be defined as the act of managing interdependencies between activities performed to achieve a goal (Malone and Crowston, 1990, cited by Munkvold, 2003). The two main categories of coordination technologies are workflow management systems, and online calendars and meeting schedulers. Calendar systems enable groups and organisations to maintain individual calendars and share these related to common events and resources, while scheduling systems enable automated search through these calendars for finding available time slots for meetings (Munkvold, 2003).

2.1.4 Integrated Products

The integrated product category covers products that incorporate functionality across other categories, typically some combination of communication, shared information space and coordination technologies (Munkvold, 2003). In general integrated products can be further divided into collaboration product suites, integrated team support technologies and e-Learning technologies. Of these the collaborative product suites are most extensive in scope of functionality including a wide range of tools, as well as serving as an infrastructure. The Integrated team support technologies are typically smaller in scale, and many of these are typically web-based. At last the e-Learning systems are based on the same technology, but the focus is on pedagogical applications.

2.2 The eCollaboration paradox

A premise for the success of collaboration technologies in organisations is that one is able to make people collaborate by using technology in addition to face-face communication. In this context, Kock (2005) describes two competing phenomena associated with the use of eCollaboration technologies. Collectively these are referred to as the "eCollaboration paradox". The two phenomena are:

"(a) People seem to consistently perceive face-to-face communication (as well as communication that incorporates key elements of the face-to face medium, such as the ability to use non-verbal cues like tone of voice and body language to convey ideas) to pose fewer obstacles to effective communication than other, particularly electronic, media."

"(b) When groups conduct collaborative tasks using e-collaboration technologies, they often present the same level of performance or even perform better than groups accomplishing the same tasks face-to-face, which is contradictory with notion (a)."

The paradox is a strange phenomenon which implies that eCollaboration technologies should be used according to certain prescriptions to be a success in organisations. This will be illustrated in the following sections.

2.3 Enterprise – wide implementation of collaboration technology

Ginsburg and Duliba (1996) present several ideals for enterprise-wide groupware implementations in their evaluation study of Lotus Notes. Their table of enterprise-wide ideals is an expansion from Goldbergs (1994) classification. The ideals mostly include the technological aspects of the collaboration technology that should be addressed if the implementation shall be a success.

- Efficient protocols: The network protocols chosen should not take up unnecessary bandwidth, and be able to share data effectively to users throughout the firm, including those in remote satellite offices
- Portable, high performance implementation: Many firms have heterogeneous desktop equipment. It makes sense that the software should be able to run on various operating systems with a similar look and feel
- Effective client interface (GUI) design: The more intuitive the design, the easier it will be for users of all computer skill levels to make use of new applications as they are developed and rolled out
- Scalability: The groupware should be able to accommodate numerous simultaneous users without a noticeable degradation of performance
- Distributed management: Administrators should be able to log on to the system from regional centers and fine tune traffic, route data around broken network components; in general, solve day to day operational issues.
- Interoperability with Legacy Systems: The groupware should be able to access data stored in mainframe databases (such as Oracle, Sybase, or DB2) or in other ad hoc development systems such as large Excel or Lotus spreadsheets.
- Distributed Security: The software should have a secure method of entry and a way for regional administrator to track security problems or perform other user maintenance.

In general the enterprise-wide ideals presented here may function as a framework for mapping the technological compatibility of a collaboration solution. This way the ideals highlight the technological aspects that must be in place.

2.4 Decision making and possible benefits

The opportunities given by the emergence of the Internet are huge, but exactly how can eCollaboration technologies contribute beneficiary to organisations? There are several areas where collaborative technologies can contribute. There seem to be a rather consensus in literature on the most obvious benefits related to collaboration technologies.

First, collaborative technologies arrange for faster decision making. By having all parties online one will to a larger degree avoid delays, and expenses and frustration related to travel may be reduced (Midwinter and Sheppard, 2000). This is further underpinned by Kock (2005) who argues that the possibility to collaborate with others independent of geographical locations is especially important. In short this gives the opportunity for groups to virtually

belong to the same business process team and collaborate, even though they are not co-located.

Second, by having increased availability to persons and competence organisations can arrange for better decision making (Midwinter and Sheppard, 2000). This is also highlighted by Kock's (2005) research that primarily focuses on business process improvements groups and eCollaboration. Kock (2005) argues that one can use collaborative technologies in terms of business process improvement as a catalyst for knowledge sharing. Since collaborative technologies are very focused around groups, Kock (2005) questions how collaborative technologies may influence business process improvements towards groups. He states that their research points to an increase in business process improvement group efficiency due to eCollaboration technology support. Those efficiency gains are primarily associated with reduced group cost, lifetime, and reliance on managers. Additionally, the evidence collected and compiled through his research suggests that knowledge sharing effectiveness, and the number of simultaneous business process improvements groups that can be conducted in an organisation, are both increased by eCollaboration technology support (Kock, 2005). As there is a high degree of correlation between knowledge and information flow an increase in information flow results in an increase of knowledge.

Last, training on advanced tools can be provided without need for travel, thus allowing new business tools to be deployed more quickly and cheaply across an organisation.

2.5 How to assess value from eCollaboration solutions

There are certain assumptions organisations will have to consider when trying to assess value from collaboration technology. To some degree these also differentiate collaboration technologies from other types of information technologies. Vandebosch and Ginzberg (1997) have identified four conditions, under which the implementation of CIT (collaborative information technology) may enhance collaboration in organisations. These conditions are 1) organizational members need to cooperate, 2) users understand the technology and how it supports collaboration, 3) the organisation provides appropriate support for the adoption, implementation, and continued use of the technology; and 4) the organisational culture supports collaboration.

Karsten (1999) argues that the one claim that current research studies seem to support unanimously is the third one concerning appropriate support for the adoption, implementation, and continued use of the technology. She argues that the importance of training, hands-on-support and a proactive stance towards adjusting the technology to the work have been identified by both researchers and practitioners (Karsten, 1999).

Karsten (1999) argues that collaborative organizational culture would appear not necessary for acceptance of collaborative work practices. In fact, collaborative technologies can be used to support the collaborative work practices in the organisation, regardless of whether the organisation has strong collaborative values or believes. This is because collaboration nevertheless can be an integrated part of how the organisation works. Further, organisational culture is seldom something uniform throughout the organisation. Large organisations with several different business units may differ significantly in practices towards collaboration, and other cultural elements. This means that the impact of the collaboration technology may differ among the different units of the organisation.

In Karsten's (1999) study of enterprise wide Lotus Notes implementation she found that in two out of three cases the collaborative technology was implemented to meet a need for a certain way of working, this be collaboration, coordination or controlling. The study found that it is possible to distinguish between three different types of collaboration, which is structured, occasional or emergent. Structured collaboration is something which can be supported in an orderly fashion, occasional is where the shared information space provides a forum for collaborative activities, and emergent collaboration is where in a particular situation actor's move towards realizing that, with collaboration, a particular task could be carried out in a better way.

Karsten (1999) further states, based on the three cases that collaborative technology demands more efforts and commitment in the implementation and requires much more focused support or "care" than traditional information systems because, first, the technologies were previously relatively unknown by those concerned, and second because the applications can give opportunities for major changes in work. At last Karsten (1999) found that collaborative technology was implemented to support the existing culture in the organisations (collaborative or not) and also used in means of challenge and change it.

2.6 An extension of the technology acceptance model

Perceived ease of use and perceived usefulness of information technologies is a widely discussed area of research. The Technology Acceptance Model (TAM) initially developed by Davis (1989) demonstrates that an individual's adoption of information technology is dependent on their perceived ease of use and perceived usefulness. Venkatesh and Davis (1996) extended TAM to include the antecedents of perceived ease of use. They found that an individual's perception of a particular system's ease of use is influenced by individual computer self-efficiency and the system usability (Venkatesh and Davis, 1996, referenced by Dasgupta et al., 2003). The TAM model has been used by Dasgupta et al (2003) to study the adoption of an electronic collaboration technology. The model can be viewed in figure 2.

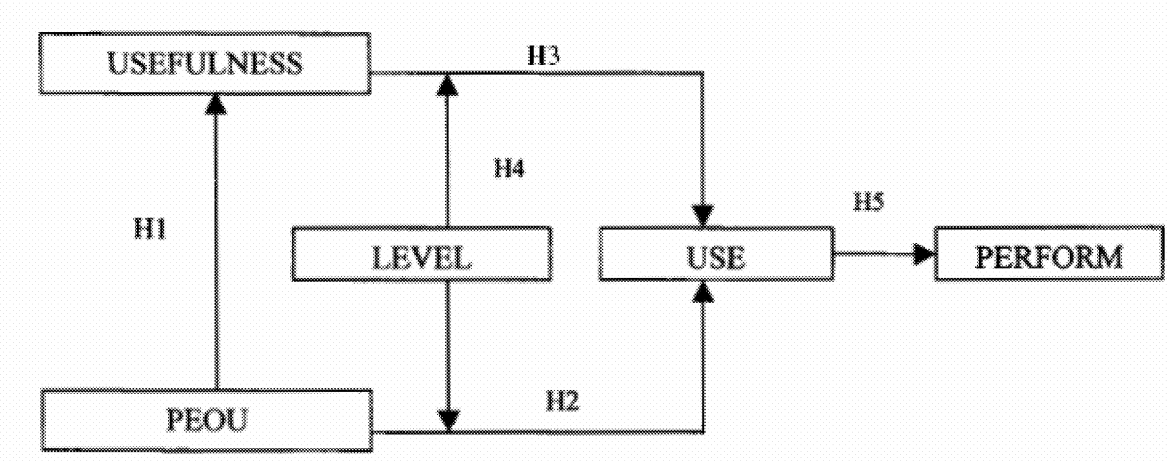

Figure 2 - The Technology Acceptance Model in Collaboration technology

In the model Dasgupta et al. (2003) adapted the variables usefulness, perceived ease of use and use from the original TAM. They included the variable perform to capture the individual users of the system, and since the study was conducted in an academic environment

performance related to academic success attained by student in class. The level variable is included to allow differentiation between novice and advanced users of the system.

Generally the research found support for the original TAM. However there were some differences. The findings can be summarized as follows:

- Perceived ease of use of eCollaboration technology has a positive impact on perceived usefulness of the system
- User level, or past experience with the group communication support system has positive effect on usage
- Use of system positively influences individual performance
- Contrary to TAM, perceived usefulness has a negative relationship with use of system

Based on the above results it is concluded that more use or past experience with a collaboration technology should improve performance.

2.7 A Taxonomy of Implementation Factors for Collaboration technologies

The previous sections have gone through the basic terms, technologies, obvious benefits and main conditions facing collaboration technology implementations. We will in this section introduce the taxonomy presented by Munkvold (2003) to more carefully be able to categorise possible factors that may influence the benefits realisation of collaboration technology implementations. The taxonomy of implementation factors for collaboration technologies includes four categories. Organisational context factors characterize the context in which the implementation takes place. This includes both factors related to the organisation's external environment, such as characteristics of the industry and relations to third parties (Munkvold, 2003). Implementation project factors are related to the organisation and conduct of the implementation project, for example user training and establishing a support infrastructure (Munkvold, 2003). The technology category is divided into factors that are more or less general to collaboration technologies, and factors that to some extent are specific to certain technologies (Munkvold, 2003). The taxonomy can be viewed in figure 3.

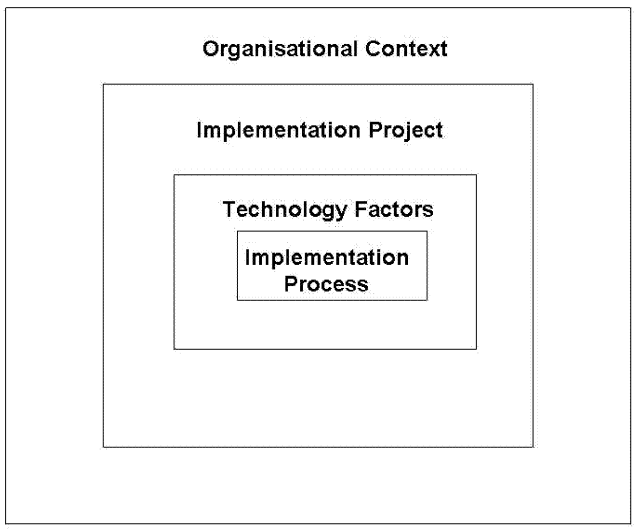

Figure 3 Categories of factors influencing implementation of collaboration technologies

By using this taxonomy we will introduce technology factors and implementation project factors that may influence to what degree collaboration technologies are implemented with success. Because of limitations in the scope of project we do not provide insight into the organisational context and implementation process.

2.8 Implementation Project Factors

There are several aspects that are highlighted in literature in terms of conducting a successful implementation project. The use of a formal Implementation strategy that supports the project in a proper manner is emphasised as important in prior research. In this section we will focus on the importance of two implementation project concepts that are important in obtaining the potential benefits from investments in collaboration technology.

2.8.1 Training

Current research studies of implementation of collaboration technologies seem to unanimously support the need of training, hands-on-support and a proactive stance towards adjusting the technology to the work processes (Karsten, 1999; Munkvold, 2003; Vandebosch and Ginzberg, 1997; Simonsen and Sein, 2004). Despite a rather unanimously agreement on the importance of a formal approach towards training and support many organisations to this date only fulfil the need for a formal implementation strategy to limited degree. There are several training issues that are highlighted in previous literature that should be emphasised through a formal implementation strategy. These can be described as follows:

Despite of a mutual perception of the importance of training, initiatives in most cases are focused on the "mechanical" functions of the technology and not how to relate the functionality of the technology to the work tasks needed to support collaboration. A "mechanical" focus towards training will in most cases where there are collaboration tools involved affect to what degree organisations obtain the potential benefits or not. If organisations shall obtain the potential benefits in an effective manner prior research suggest that training should be adjusted to fit the actual work processes rather than the "mechanical" possibilities of the tools (Simonsen and Sein, 2004; Munkvold, 2003).

In addition to training focused on work-processes organisations should emphasise the need for follow – up support to users. The need for careful selection of special roles for follow-up support is widely supported by literature (Karsten, 1999; Munkvold, 2003; Simonsen and Sein, 2004). By appointing superusers to the project organisations can support end users in utilising the technology on the local level of the organisation. Superusers should be carefully selected and trained so that they are the natural contact point when users are having problems with the technology.

As described in the section on the eCollaboration paradox most people prefer face to face interaction despite that use of collaborative features is likely to be just as effective, or even more effective. In terms of training in collaborative features this issue should be emphasised. Despite that collaboration technology provide the opportunity for features like eLearning; this should not totally replace the more traditional face-face interaction. By including some face to face specific initiatives towards training organisations can build user relations to the technology and demonstrate functionality directly related to the users' work processes.

As the section above describes, there is a need for a formalised approach towards training in organisations. Simonsen and Sein (2004) explored a formalised learning and training framework and used it to analyse the training strategy in a large organisation. Their results highlighted the discussed issues and several other important factors that should be emphasised when organisations develop their learning and training initiatives. The different issues is summarized in table 1

Table 1 - Characteristics of a formal training strategy

Component	Best Practice Mechanisms
Mission statement	• Align The training unit's mission with the organisational objectives • Closely work with organisational units • Regular meetings with key management personell
Training need determination	• To identify trainee needs: Analyze corporate business plans, and business processes, specialized roles such as relationship managers • Training managers regularly held meetings with functional area managers
Training ownership	• The training ownership completely in the hands of the business units, or controlled by then
Content of the training session	• Use specific business process examples during training to address motivation • Use functional area personnel as trainers
Evaluation and assessment	• Use certification • Perform evaluation by line managers

2.8.2 Best practices

The success of collaboration tools are to a large extent dependent on group interaction. To characterize and map the behaviour of individuals interacting in groups are a very difficult process. In terms the complexity of group interaction prior research suggest that there should be an increased focus towards the development of guidelines and routines for effective use of collaboration technologies (Kvestad and Olsen, 2005; Munkvold, 2003). Prior research suggests that the development of best practices for effective use should be carefully planned and implemented in the organisations. Based on prior research we have identified several issues that should be emphasised by organisations when they develop their best practices.

- There must be a deliberate approach: Best practices should be based on careful analysis of the work setting and how the features of the technology can be best matched with this.
- The practice must have gone through an evaluation to prove that it represents the best practices available: Despite its importance, the Best practices won't be adequate in the early phases of implementation. They require a period of learning and experimenting with the technology.
- The practice must be continuously challenged: Once the best practices are implemented they should be continuously challenged and adjusted necessarily to meet the business units' needs.

Based on the underlying elements presented above organisations can develop a structured method towards the establishment of best practices.

2.9 Technology-Related factors

Midwinter and Sheppard (2000) present three central barriers to use of collaboration technologies, which in terms also is presented in use of other IT solutions. These are functionality, ease of use and security. They argue that applications like MS NetMeeting provide users with very powerful collaboration tools, as well as basic audio and video conferencing capabilities. A problem concerning this type of tools, and which is also one of the major criticisms of many collaboration applications is that they are too complex too use. Note that MS NetMeeting is an "old" application that is very much replaced, but despite of this the issue concerning complexity still is relevant. Ease of use and perceived usefulness are also concepts that are relevant in the context of collaboration technologies. We introduced these concepts in the section on technology acceptance with collaboration technologies.

As described by Midwinter and Sheppard (2000) traditional factors that affect the success of IS implementations are also present in collaboration technology implementations. In addition prior research suggests that several other factors must be taken into consideration. The technology related category includes all factors related to the characteristics of the technology. We will present general factors and more technology specific issues related to the content management solutions and corporate search engines.

2.9.1 General Factors

Based on the implementation and development of groupware applications, Grudin (1994) developed eight general factors that may influence to what degree organisations realise the potential benefits. In the context of collaboration technology implementations Munkvold (2003) has modified this framework by excluding development specific elements, and including some implementation specific elements.

There seem to be a rather unanimously perception in prior research that collaboration systems differ from single – user tools because they are interdependent among the users in that the benefits and costs of the applications to one user are contingent on the behaviour of other users (Grudin, 1994; Ellis, 1997; Munkvold, 2003). This issue may cause several impacts on the implementation of collaboration technology. First, it may affect the individual perceived usefulness of the collaboration tools because the "workload" provided by different users to make the solution work properly differ, despite that more work does not necessarily mean more benefits. A disparity in work and benefit may this way represent a barrier to user adoption. Second, it becomes difficult to evaluate the realised benefits because success is dependent upon the match of the technology to the task (Ellis, 1997). A definite example of this can be drawn through Munkvold's (2003) research on an enterprise-wide implementation of Lotus Notes. In his research the acceptance of the technology varied from tool to tool. While the applications that were characterised as support tools were used extensively (e-mail, group calendar, meeting room reservations, archiving, etc), applications requiring input from each user in a common database were slower in adoption. In general, tools for distribution of information, enabling one-to-many communication, was widely accepted. The document and management workflow tools requiring each user to produce input to shared database was used less, although these applications was believed to have the greatest potential for improving efficiency.

Collaboration technology is dependent on group interaction among individuals. When individuals are working towards one single goal it is important that "harmony" is maintained in the collaboration process. In terms of this it is very important that the tools used in the

collaboration process do not disturb the "harmonic" state of the collaboration. Disruption of social processes may lead to user resistance and eventually cause a slower adoption of the technology.

As can be seen in the enterprise wide-ideals for implementation of collaboration technology it is important that the underlying technology is in place and works properly to realise the potential benefits. If the technology is immature it may easily lead to problems with stability and performance, which in terms may cause distrust among users. There is also a need for compatibility with existing technology, either that is in terms of users' frustration and fallback to prior work practices or interoperability with prior systems (Munkvold, 2003; Ginzburg and Duliba, 1996).

In addition to the issues mentioned above, prior research (Grudin, 1994; Munkvold, 2003) suggests that several other factors should be emphasised in the implementation of collaboration technologies. A summarize of the general factors that may influence to what degree organisations realise benefits from their investments in collaboration technology is summarized in table 2.

Table 2 - General implementation factors for collaboration technology

Factors	Possible effects to collaboration technology
Disparity in work and benefit	Perceived disparity in extra workload and benefit induced from the technology may represent a barrier to user adoption
Disruption of social processes	Technologies that represent disturbances to the often tacit social processes risk facing user resistance
Exception handling	Exceptions to the formal routines occur frequently in the day-to-day work practices. Some flexibility should be built into the systems, to accommodate for these exceptions
Unobtrusive accessibility	Some collaborative tools are not used as frequently as other office support tools. By offering seamless integration with the users standard work tools, the collaboration tools also accommodate more infrequent use.
IT maturity	Immature technology can create problems with stability and performance of the solution, resulting in project delays and distrust among the users
Compatibility with existing technologies	Technical incompatibility can result in project delays and frustrated users
Compatibility with existing routines	Compatibility with existing routines means less "friction" in user adoption. However, some implementations will aim at changing these routines
Fragile nature of collaboration technologies	In case of problems with a new collaboration technology, users may easily abandon this in favour of existing, substitute technologies more familiar to them

2.9.2 Factors related to content management

All organisations need to manage information in a way so that it can be accessed and used when it's needed. Enterprise Content Management (ECM) is an approach to manage all this information that exists (Smith and McKeen, 2003). The information managed by an ECM system can include paper documents, reports, web pages or digital assets. This is information

which previously has been managed separately, and an ECM system integrates these repositories of unstructured information (Alsup, 2004). An ECM system also has to manage content from all over the organisation, not only certain functions or areas. In this section we will provide issues that are important in relation to implementation of content management systems.

"Content management is any methodology for creating and organizing content to facilitate its retrieval en reuse". (Votsch, 2001)

"Content Management is the creation, publishing and management of company information and documents on the web." (McNay, 2002)

"The strategies, tools, processes and skills an organisation needs to manage all it's information assets (regardless of type) over their lifecycle." (Smith and McKeen, 2003)

Content life cycle support
There seem to be a rather consensus in research on the factors that influence successful implementations of content management system. The importance of having a content management system that supports the entire content lifecycle with repositories and library services (checking in/out, version control etc.) is emphasized by several research studies on content management (Medina et al, 2002; McKeen, 2003; Votsch, 2001; McNay, 2002).

Metadata
Metadata is meant to describe the content by adding value to it, and thus include information about the content. Managing metadata is by prior researchers highlighted as a major factor influencing whether the content management process is effective or not (Votsch, 2001; McNay, 2002; Munkvold, 2003). To manage metadata properly involve attaching the right metadata to the content so that it gets easier to find and reuse it in a future situation. It is no certainty that "normal" end users do this in a proper manner, because users' conceptual understanding of metadata may differ. In terms of this content management implementations often require that new roles and responsibilities are included so that the quality on the data are maintained and controlled.

In addition to the issues highlighted above Ellis (2002) emphasise several other factors that should be taken into consideration when organisations implement a content management solution.

Miscalculating the cost of ownership
The functionality in content management systems is different, and in some cases it can be necessary to develop special elements which are not included in the out-of-the-box solution. This can lead to bigger development costs and time, and it will probably take longer before the benefits from the investment are realized.

Not accommodating the needs of non-technical users
Most users in an organisation are not part of the technical staff. It is therefore important that the content management system should be easy to use, browser-based and allow multiple content contributors. This will make the chances greater for enterprise-wide adoption of the system, and so increase the chances for maximum productivity and collaboration across the enterprise.

Underestimating the change management component of your content management
Implementing an ECM system causes changes in work processes and workflows for all the involved users. To get a successful implementation and to get the efficiency and benefits from an ECM system, the implementation should emphasize the users and the need to go through a cultural paradigm shift in the organisation.

Ignoring requirements for integrating the content management system with other applications
It is important to consider how well the content management system will integrate with other applications that also support the strategic business initiatives. For example how it communicates with databases and other infrastructure and how it integrates with the application server or corporate portal solution. The system should be flexible enough to integrate with other e-business applications, or be installed alone.

Failing to think about future needs
Investing in a content management system equals investing in long-term strategic goals. Purchase should be planned accordingly to make sure that the content management system will meet the growing needs in the organisation. As the organisation grows, the need to manage content will also grow, and so it is essential to look after a system that both accommodates the immediate needs and the changing needs over time.

2.9.3 Factors related to search mechanisms for effective retrieval of information

Before the emergence of the Internet, Information Retrieval was considered a narrow field of interest that mainly was considered important by librarians and information scientist. As Stenmark (2005) argue this perception was radically changed with the emergence of the World Wide Web. As a consequence of the World Wide Web a strengthened focus on the development of corporate intranets emerged. These are interorganisational networks based on web technology. Similarly to the users of the World Wide Web, intranet users were also in need of sophisticated search tools for information retrieval. Based on prior research Stenmark (2005) argues that if little is yet known about information seeking on the web, virtually nothing is know about intranet searching. Based on the perception that there is a lack of research done on the effective use of intranet search engines, we have based this section on the research done by Stenmark (2005). He has identified the following factors that may influence the potential benefits realised from intranet search engines.

Differences among users' behaviour towards search of information
Based on the overlying assumptions, Stenmark (2005) has conducted a study that seeks to investigate users' information sharing behaviour with respect to different days and different hours of the week. Such data can be useful when trying to optimize web search engines performance by intelligent allocation of resources (Ozmutlu and Spink, 2004, cited by Stenmark, 2005). The study argues that there is possible to make a distinction between users of the web. In example, normal web users differ significantly from librarians and other trained information retrieval specialists in their search behaviour. This is a principle that most likely also is present with corporate intranets.

Differences among users' search behaviour of public search engines and intranet search engines

In another study Stenmark (2005) has examined log files from a corporate intranet search engine, and have analysed the actual web searching behaviour of real users situated in a real business environment. In his study Stenmark (2005) questions whether there is a difference between public search engines and intranet search engines in terms of users' way of searching; in general measured by session length, query construction and use of search results. The evidence found in Stenmarks (2005) study is summarized in table 3.

Table 3 - Search behaviour on corporate intranets and public search engines

	Public web users	**Corporate intranet users**
Session length	Short	Short
Query construction	Use of few search terms	Use of few search terms. Use fewer terms than privously reported
Use of search results	Look at few result pages.	Look at few result pages. Differs in that a much larger portion only seem to examine the first result page.

As the table highlight there seem to be few or no differences in length of sessions between public web users and corporate intranet users. However, Stenmark (2005) speculate in that web users "know" that the answer is out there and hence are likely to be more persistent, while intranet searchers give up quicker , assuming that the information they are looking for does not exist on their corporate intranet. This is an interesting hypothesis, but as Stenmark (2005) argues there is a need to test it more accurately.

3. Assessing the value of IT investments

Evaluation of IT investments has been a widely discussed area within IS research for many years. Questions like "what is the value of Information Technology (IT)?" and "how does investment in IT affect productivity?" have gained a lot of attention in business and academic environments the past years (McKeen et al., 1998). This chapter will start by making a brief historical introduction into the area of evaluative IS research before we present an emerging framework related to evaluation of Information systems.

3.1 A historic review

The basic model for how to assess value from IS investments can be viewed in figure 4. This model is based on the assumption that investing in IT will lead to increased organisational performance.

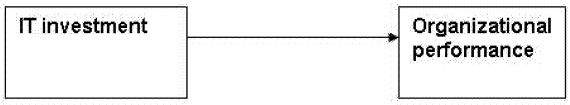

Figure 4 - Basic model for assessing value from IT investments

This model has been enhanced in many ways depending on the variables used. One researcher which has modified this model is Weill (1988, cited by McKeen et al., 1998) who has developed the concept of conversion effectiveness. He describes this as the ability to convert IT expenditures into assets that provide value to the investing firm. The concept of conversion effectiveness has been further modified by Markus and Soh (1995, cited by McKeen et al., 1998). They suggest that there are two groups of moderating factors which determine whether or not IT value is realized. These are 1) structural factors that create differences among firms in their ability to derive benefits from IT spending and 2) internal managerial processes including formulating IT strategy, selecting an appropriate organizational structure for executing IT strategy, developing the right IT applications and managing IT application development projects effectively (Markus and Soh, 1995, cited by McKeen et al., 1998). Kaufmann and Weill (1989, cited by McKeen et al., 1998) further argue that IT effectiveness should be an important mediating variable in the relationship between IT investments and organisational performance. This is based on the argument that investment in "state of the art" IT not is enough to increase organisational performance. McKeen and Smith (1993) on the other hand argue that IT budgets have been used almost exclusively as a measure of degree of computerization and that this has led to a neglect of an important facet of information technology, i.e. deployment. They argue that it is counterproductive to attempt to consider the impact of IT on performance without taking into consideration the role of people. Only through joint consideration of resources, people and IT will the value of IT be revealed (McKeen and Smith, 1993).

It is evident that there is a substantial degree of agreement among the models used to assess the value of IT. There is a consensus among researchers in that there should be a deterministic mediating factor(s) between IT investment and organisational performance. Based on this McKeen et al. (1998) have developed a synthesized model which are based on the prior models developed (Trice and Treacy, 1988; Weill, 1992; Lucas, 1993; McKeen and Smith, 1993; Markus and Soh, 1995). The synthesized model binds together the other models into

one. McKeen et al. (1998) argue that this model is more complete, cohesive and that it can apply to all sorts of projects and organizational forms. The model can be viewed in figure 5.

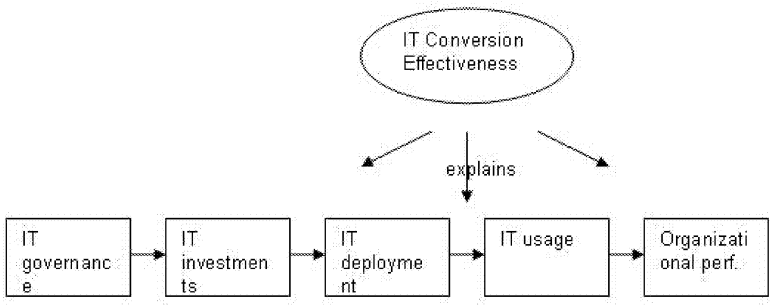

Figure 5 - Model for assessing value from IT investments (McKeen et. al, 1998)

The model suggests that IT investments must undergo a chain of transformational processes before resulting in organizational performance (McKeen et al., 1998). This means specifically that a senior management decision must specify the form and extent of the IT within the organization is it internal or external to the firm, developed in-house, outsourced, or supplied through third party vendors. Thus, the organization must decide on the form of governance which will be adopted on a transactional or ongoing basis. This leads to a specific IT investment, following which IT must be deployed before it can be used beneficially by the organization to enhance its performance (McKeen et al, 1998). Like this the model can be used both to assess value from IT investment and to describe the process from investments through deployment, use and eventually organisational performance.

The concept of taking both people and IT into consideration presented in McKeen and Smiths model (1993) is also used by Ross et al. (1996). They argue that firms must organize around three key assets to gain long term competitiveness from their IT investments: (1) a highly competent IT human resource, (2) a reusable technology base and (3) a strong partnering relationship between IT and business management (Ross et al, 1996). They further argue that the answer lies in the development of an especially effective IT capability; the ability to control IT related costs, deliver systems when needed, and effect business objectives through IT implementations. The model developed by Ross et al (1996) can be viewed in figure 6.

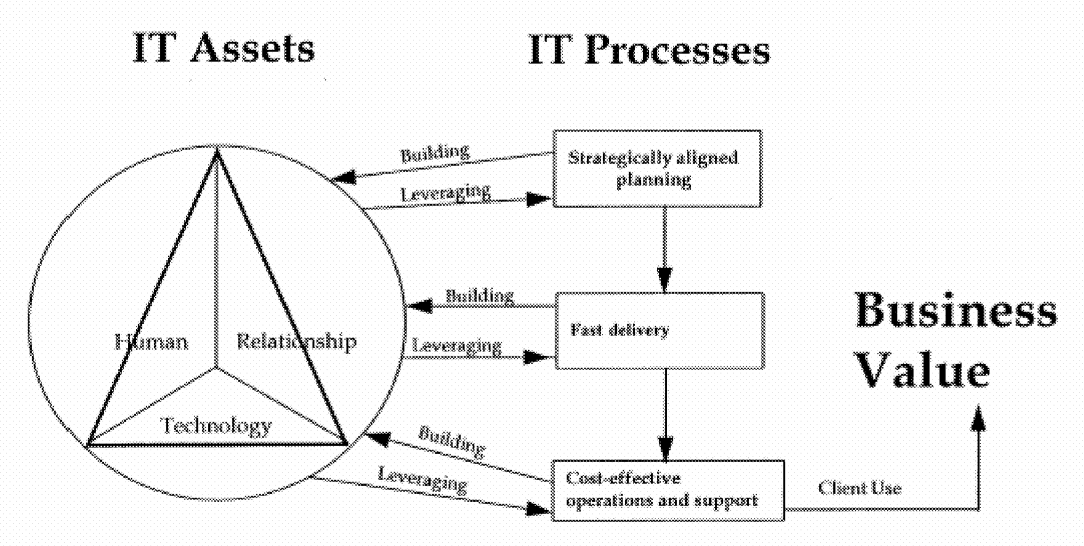

Figure 6 - Delivering busines value from Information Technology (Ross et. al, 1996)

Davern and Kaufmann (2000) have further used the concept of conversion contingencies in their model of discovering and realizing value from IT investments. They argue that it is necessary to determine potential value to identify the actual return value of the investment. They expand the original view on IT which propose to invest in complementary assets like management skills and user training (Soh and Markus, 1995, McKeen et al., 1998) with a concept called the locus of value and value conversion contingencies to explore how potential value from an IT investment turns into realized payoff for an organization. The concept of conversion contingencies has been adapted from the earlier described model by Lucas (1993). Davern and Kaufmann (2000) model can be viewed in figure 7.

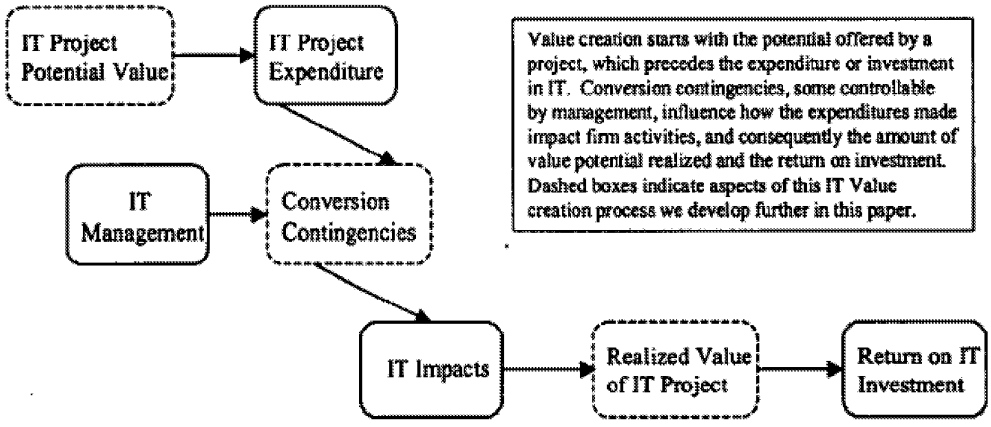

Figure 7 - The IT value creation process: From potential value to realised value and return (Davern and Kaufmann, 2000)

Davern and Kaufmann (2000) argue that an appropriate assessment methodology is one that leads to an understanding of the potential value of an IT investment. On the other hand the investment decision also must be based on a comparison of the potential value that management saw in the project with respect to the realized value following implementation, in light of the value conversion contingencies that intervene (Davern and Kauffman, 2000).

3.1 Benefits Management

In this section we will present one emerging framework for the evaluation of information technology investments. This is the benefits management framework presented by Ward and Murray (1997, cited by Lin and Pervan, 2001).

Evaluation of IT investments is difficult because there is a delay between an IS and the effects of this IS (Al-Tameem and Wheeler, 2000), and the evaluation and realization of the benefits is a mixing of financial, organizational, social, procedural and technical effects (Lin and Pervan, 2001). Because of this, Al-Tameem and Wheeler (2000) argues that evaluation of IT investments should be viewed not as a set of tools and techniques, but as a process which has to be understood for it to be effective.

To deal with the difficulties of achieve and maximize the expected benefits from the IT investments, researchers have suggested a way of evaluating and realize the benefits; namely Benefits Management (Lin and Pervan, 2001). Benefits Management (BM) is defined as "the process of organizing and managing IS development, so that the potential benefits arising from the use of IT are actually realized" (Ward and Murray, 1997, cited by Lin and Pervan, 2001).

The purpose of the BM process is to improve the identification of achievable benefits, and to ensure that decisions and actions done during the implementation lead to the realisation of all these feasible benefits (Ward and Daniel, 2006). The process itself does not overcome the problems of achieving the benefits, but specifically addressing the core issues in realising the available benefits, Ward and Daniel (2006) argues that it has been used in many organisations resulting in improved benefit delivery by changing the way IT/IS investments have been managed.

Ward and Murray (1997, cited by Lin and Pervan, 2001) introduced the process model of BM developed by the Cranfield research program, and argue that this model can be used as the basis for guidelines on best practice in BM. The process model can be viewed in Figure 8.

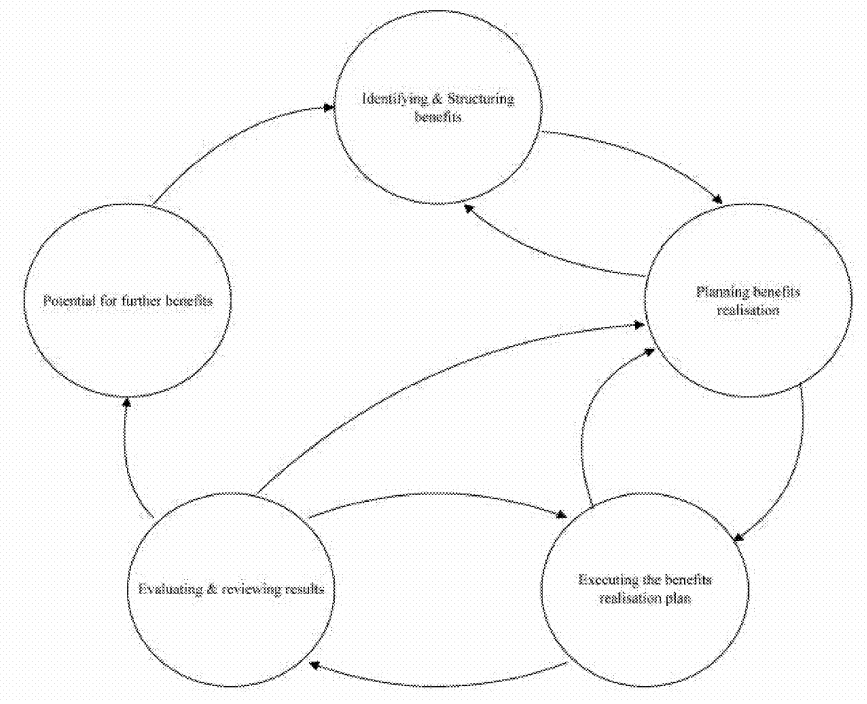

Figure 8 - The process model of BM (Ward and Murray, 1997)

The model illustrates five stages, and as underpinned by Lin and Pervan (2001) the use of this process model makes it possible to diagnose why some projects are successful in delivering benefits, and others are not. It is also possible to show how the less successful projects can be addressed to obtain the benefits that have not been realised, and also to uncover and help realise further benefits. This process should be used as the driving mechanism for managing the change activities in an organisation (Ward and Daniel, 2006).

We will shortly present each of the five stages in the iterative process, and the relationship between them to get an overview of the main issues and activities in the BM process.

3.1.1 Identifying and Structuring the Benefits

This stage involves an iterative process of establishing the investment objectives and the business performance improvements that the technology and associated changes could deliver (Ward and Daniel 2006). The nature of the business contribution expected from the investment can be determined based on the outcome of the strategic analysis, planning activities and discussion. Ward and Daniel (2006) argue that if the benefit can not be measured or no one owns it, it does not really exist. Therefore it is important for each potential benefit identified to be precise about where it will occur in order to determine how it can be measured and who should be responsible for its delivery.

3.1.2 Planning Benefits Realization

The main purposes of this stage are to develop a comprehensive benefits plan and a business case for the investment (Ward and Daniel, 2006). The benefits plan together with the benefits

network is means of ensuring these links are made. The benefits plan includes both the intended benefits and how they can be achieved. The plan is the foundation for the business case that is necessary to obtain funding and also for managing the project (Ward and Daniel, 2006).

3.1.3 Executing the Benefits Plan

The next stage in the process is to carry out the plan and adjust it as necessary, as issues and events affecting its viability occur (Ward and Daniel, 2006). It is important to monitor the progress against the activities and the deliveries of the benefits plan, and it might be necessary to establish temporary targets and measures to evaluate the progress towards the final implementation. During this stage, further benefits may bee identified, or it may become apparent that expected benefits are not relevant. The benefits plan should be modified accordingly along with any changes in the functionality or business changes (Ward and Daniel, 2006).

3.1.4 Reviewing and Evaluating the Results

The purposes of the reviewing of benefits involve both assessment of the investment itself and organizational learning. Ward and Daniel (2006) argue that one of the factors that differentiate successful companies from less successful in their deployment of IT/IS is that management resolve to evaluate the investment after the completion. This stage should involve all key stakeholders, and focus on what benefits that has or has not been achieved and why, and identify further action needed to deliver more benefits if needed. The review will give the organisation knowledge to help them:

- determine and confirm which planned benefits have been achieved
- identify which expected benefits have not been achieved and to decide if remedial action can be taken to still obtain them, or if they have to be foregone
- identify any unexpected benefits that have been achieved and any unexpected "disbenefits" that have resulted
- understand the reasons why certain types of benefits were or were not achieved and provide lessons for future benefits
- understand how to improve the organisation's benefits management process for all projects

By identifying the unexpected benefits and understand how they came about, may prove valuable input to improve the first stage of benefits management in future project. It is important that this review is an objective process focused on future benefits, and not a way of allocating blame for past failures. It gets difficult to get honest appraisal and a constructive critique of the implementation if this is seen as a negative process.

3.1.5 Establishing the Potential for Further Benefits

This stage is important for not to overlook any available benefits (Ward and Daniel, 2006). Earlier research (Ward et al., 1996) found that it is difficult to predict all the benefits of a system in advance. This is because some benefits become apparent after the system has been implemented, or running for some time, and all the associated business changes have been made. It is therefore important to review the process (stage four), and to consider what further

improvement is possible in consequence of the system implementation and the associated changes, and in light of the new levels of business performance that have been achieved (Ward and Daniel, 2006).

4. Research Method

In this section we will describe our research method for this thesis. We will describe the research strategy. Then we will provide an in-depth description of how we collected our data.

4.1 Research Strategy

Our research is based around Statoil's new eCollaboration solution. We have chosen to use a case study as our research strategy. The case study is a research strategy which focuses on understanding the dynamics presented within single settings (Eisenhard, 1989). Our mission is to explore whether Statoil has gained the potential effects/benefits they have identified pre-project. In brief, Yin (2003) describes the case study as a method which allows investigators to retain the holistic and meaningful characteristics of real-life events – such as individual life cycles, organizational and managerial processes, neighbourhood change, international relations, and the maturation of industries.

We are going to investigate a real life enterprise-wide implementation of an eCollaboration solution conducted in Statoil. Large enterprise-wide implementations will in most cases involve large and complex changes to both organisational and managerial processes. Lee (1989) refers to a Management Information Systems case study as an examination of a real-world MIS as it exists in natural, real-world setting. Yin (2003) defines a case study as an empirical enquiry that investigates a contemporary phenomenon within its real-life contexts, especially when the boundaries between phenomenon and context are not clearly evident. Case studies are not dependent on quantitative data. Yin (2003) describes five different applications. The most important one is to explain the presumed causal links in real-life interventions that are too complex for the survey or experimental strategies. For example in the evaluation language, the explanations would link program implementation with program effects (Yin, 2003). This is about exactly what we are going to do in our research and it therefore serves as a good foundation for selection a case study as our research strategy. Further Benbasat et al. (1987) states that case studies are particularly well-suited to IS research, since the object of our discipline is the study of information systems in organisations, and interest has shifted to organisational rather than technical issues.

Statoil's eCollaboration Strategy (Statoil, 2002) describes eight strategic goals that are further operationalized into effect goals they seek to obtain. In addition we also want to find out whether there are effects (positive or negative) which they have not though about pre and during project delivery. Concerning the fact that the implementation project is still running these issues suggests that a qualitative case study is the best approach.

4.2 Research Design

The primary distinction in designing case studies is between single – and multiple – case designs (Yin, 2003). The eCollaboration vision states that the solution shall contribute to increased value by effective collaboration among internal and external participants. In theory this gave us two main case study options. A single case study involving only Statoil, or a multiple case study involving one or several external participants. A single case study is more vulnerable than a multiple case study. As Yin (2003) argues, even if you can only do a "two-case" case study, your chances of doing a good study will be better than by using a single-case design. By using a multiple case-study one will have the possibility to compare and the

analytic benefits from having two or more may be substantial. However, in our project the time-frame is limited and the researchers are rather inexperienced, so in conversations with our contact person at Statoil and our advisors we found that a single case study would be the best alternative for us.

4.3 Selection of case organisation

Statoil has a collaborative relationship with Agder Univesity College. Based on this they every year provide the University with possible topics that may be relevant in terms of master thesis. Based on this we chose one topic that interested us, and because of this Statoil became our case organisation for this research.

4.4 Data Collection

In our study, which may be considered an evaluation study one would probably believe that quantitative data collection would be the most sufficient way to collect our data. Prior to the project and in the early phases this was also the researchers' intention. However, concerning the fact that the eCollaboration solution is still under implementation and that many researchers have argued that benefits in IS projects are more likely to occur a while after implementation we chose to reconsider this approach. Then in discussion with our contact persons we came to agreement on using qualitative interviews as our data collection method.

The preparation for data collection can be complex and difficult, and if not done properly the entire case study investigation can be jeopardized (yin, 2003). Because the researchers are relatively inexperienced in doing case studies we chose to use more time than usual to get an in-depth understanding of the area of research by studying literature.

4.4.1 The Interview guide

To conduct our interviews we had to form an interview guide. Interviews are one of the most important sources of case study information. To do so we had a preliminary meeting with our two contact persons in Statoil and our two advisors. At this meeting we exchanged ideas to have a good foundation for forming a first draft of the interview guide.

When selecting respondents we had to take several issues into consideration. The amount respondent's necessary to conduct a reliable research, the scope of the project and what respondents to be interviewed. As a step in making sure construct validity is sustained Yin (2003) argues that one will have to use multiple sources of evidence. With this in mind we came to agreement with Statoil to conduct our interviews with several types of Statoil Employees, both normal users and users directly involved in the core project group.

Authors describe three different types of interviews that in most cases are used (Yin, 2003., Tellis, 1997). These are the open-ended interview, focused and structured. Most commonly, case-study interviews are of an open-ended nature. In this interview key respondents are often asked to comment on certain events. By doing this the respondents may provide solutions or insight into events (Tellis, 1997). The focused interview is typical when the respondent is interviewed in a short period of time – an hour, for example (Yin, 2003). We chose to form a two – part interview guide including one open – ended part, and one more structured part. By using an open-ended part our intention was that if the respondents are given room to speak freely they may reveal information that either the researchers or the core project group has not

thought about. In this case it could be effects (positive/negative) which has not been taken into consideration when forming the eCollaboration Strategy (Statoil, 2002) and the project handbooks for delivery (Statoil, 2004; 2005a, 2005b). The use of an open – ended part was discussed and agreed on with the key contacts at Statoil in the preliminary meeting. In the focused part we had a more structured set of questions (see appendix A). By doing a focused interview part our main intention was to corroborate or disprove if the effect and process goals stated in the project handbooks has been achieved. This way, the focused part was formed with a set of questions divided into pre-defined categories known according to central Statoil internal documents (eCollaboration strategy, project handbooks, fact sheets). The focused part was also made with intentions that we could use it as a check list to make sure we got all the answers we needed. It is not given that one will gain all the information one is in need of by just letting the informants speak freely. To assure that the focused part would be suited as a checklist we did some reliability testing on it. This was done by uploading the guide to an external teamsite for Agder University College in the collaboration@Statoil solution. The intention by doing this was to make key participants and our advisors able to comment on the drafts we uploaded. In all there were uploaded three drafts before there was a definite agreement on the final interview guide. The optimal solution would have been to conduct one or more pilot interviews to make sure the interview guide worked properly, but the scope of our project limited this opportunity.

The interviews were conducted over a two week period at Statoil's headquarter at Forus, Stavanger. Both researchers were present at all interviews. This was done because we wanted to obtain both researchers impressions the interviews. This makes it possible to discuss findings and possible differences of impressions directly after the interviews. The interviews were formed to last for approximately one hour each, and we conducted thirteen interviews. In the first round we interviewed 6 respondents, whereas most of the respondents had involvement in the implementation of the project. In the second round most of our interviewees were end-users of the solution.

We chose to tape-record our interviews. According to Yin (2003) audiotapes certainly provide more accurate rendition of any interview than any other method. To be sure that the respondents were comfortable with us using tape-recorder we asked every single respondent if we could use it. The respondents acted open and were more than likely willing to express their meanings and feelings, and didn't seem affected by the recording. In table 4 the different respondents with their position, group and what business area they are attached to can be viewed.

Table 4 - Respondents according to role, group and business area

Role in impl. project	Group	Business area	Position
Responsible for implementation F&M	Core Project group	F&M	RIM (Record and information manager)
Responsible for implementation T&P	Core Project group T&P	T&P	External Consultant
Project manager (to summer 2005)	Core Project Group	NG	
Program manager	Core Project Group	Entire organisation	Project Manager

None	End user	I&K	RIM (partly)
Responsible for implementation I&K	Not member of CPG	I&K/SNE	RIM
Superuser	End user	Anskaffelsesfunksjonen?	Leader competence and personnel development
Responsible for implementation T&P	Core Project group T&P (since 2004)	T&P	RIM
None	End user	?	Special advisor
Superuser	End user	KTJ? Drift og vedlikehold	Senior engineer
None	End user	T&P	Senior Engineer
Superuser	End user	NG	RIM
None	End user	KTJ	RIM

4.4.2 Document analysis

In addition to the interview guide we have used document analysis as a medium for collecting the evidence. The documents used in our research are typically documents with definite importance in accordance to the implementation process of the solution. Our purpose by using documents is described in good fashion by Remenyi et al. (2003). Documents are primarily used to corroborate and augment evidence from other sources. They are helpful in verifying spellings and titles. They provide specific details that can support the verbal accounts of information. They can set the context for interviews or discussions within the organisation studied (Remenyi et al. 2003). The documents involved in the project are described in the case description.

4.5 Data analysis

Data analysis consists of examining, categorizing, tabulating, testing or otherwise recombining bout quantitative and qualitative evidence to address the initial propositions of a study (Yin, 2003). The first step in data analysis is the transcription of the data. When using a tape-recorder the recorded media files will have to be translated into words written on paper. After this is done researchers propose several methods of data analysis. Spiggle (1994) proposes to go through a method which involves seven steps. These steps include categorization, abstraction, comparison, dimensionalisation, integration, iteration and refutation. This approach is pretty similar to other approaches of qualitative data analysis. The most common approach is developed by Glaser and Strauss (1967) and is called “The grounded Theory”.

Categorization is the process of classifying or labelling units of data. The essence of categorization is identifying a chunk or unit of any data as belonging to, representing or being an example of some more general phenomenon. Categorization involves naming, or giving labels to, instances of the phenomenon found in the data. A passage categorized with a specific label may be a few words or many pages long (Spiggle, 1994). In our interview guide we used predefined categories based on the effect goals formulated in the project handbooks.

The next step then was to go through each of the interviews carefully and classify the information within each category. Each interview was rewritten into bulleting lists. Doing it like this we had to add a numbering system to the summaries so that we easily could go back to the raw transcripts to retrieve information. For example in matters were quotes was necessary to state our findings in the report. An example of the numbering system can be viewed in table 5.

Table 5 - Numbering system for easy retrieval of analysis data

Intervju	Nr	Summary	Full text
1	E2	• Important to make them available so that people can use them	

By using the letter E we knew that this question is related to Best Practices, and by using the number 2 we know it is related to the answer provided for question two in the transcript.

Because the categories were predefined, and that we used an open – ended part in the interview we had to be open-minded an add categories if several transcripts involved information which did not fit into the predefined categories.

The next phase in our data analysis is Abstraction. Abstraction builds on categorization. It surpasses categorization in that it collapses more empirically grounded categories into higher-order conceptual constructs. Abstraction goes beyond identification of patterns in the data. It groups previously identified categories into more general, conceptual classes (Spiggle, 1994). In this step we have gone deeper into the interviews and studied our categories in-depth. By doing this we sought to see if there were possible to categorize into even more general classes.

Comparison explores differences and similarities across incidents within the data currently collected and provide guidelines for collecting additional data. Systematic comparisons employ the principles of logic in making inferences from data (Spiggle, 1994). In this phase we compared the categorised material to explore differences and similarities.

5. Case description

In this section we will introduce the organisation and important issues related to the case study we have done in Statoil.

5.1 Description of Statoil

Statoil is an integrated oil and gas company with considerable international activities. Represented in 33 countries, it is engaged in exploration and production in 15 of these. Statoil's is Norwegian owned and its head office is in Stavanger, Norway (Statoil ASA, 2006)

Statoil has about 25.500 employees and forty – nine per cent of them works outside Norway. Statoil is operator for 24 oil and gas field in the Norwegian continental shelf and accounts for 60% of all Norwegian petroleum production. As operator of 23 seabed facilities, Statoil is a leader in sub sea production (Statoil ASA, 2006).

Despite of its large size, Statoil is still a fast growing company. In 2005 they had a Net Income of 30.7 billion NOK which is the best ever result in Statoil's history. Accordingly they had a 60% increase in international oil and gas production (Statoil ASA, 2006).

Statoil aims to be able to compete with the best in priority areas, both in its domestic markets and where it participates internationally. The group's key operational objectives in the years ahead are:

- maintain an equity production of one million barrels of oil equivalent per day from the Norwegian continental shelf (NCS) after 2010
- build up an international portfolio which helps the group to achieve a long-term growth of 2-4% in 2007-10
- double sales of equity gas to 50 billion cubic metres per annum by 2015
- increase value creation in manufacturing and marketing through improvements to the business, integration and world-class operations
- be acknowledged as a project developer with first-class expertise and technology

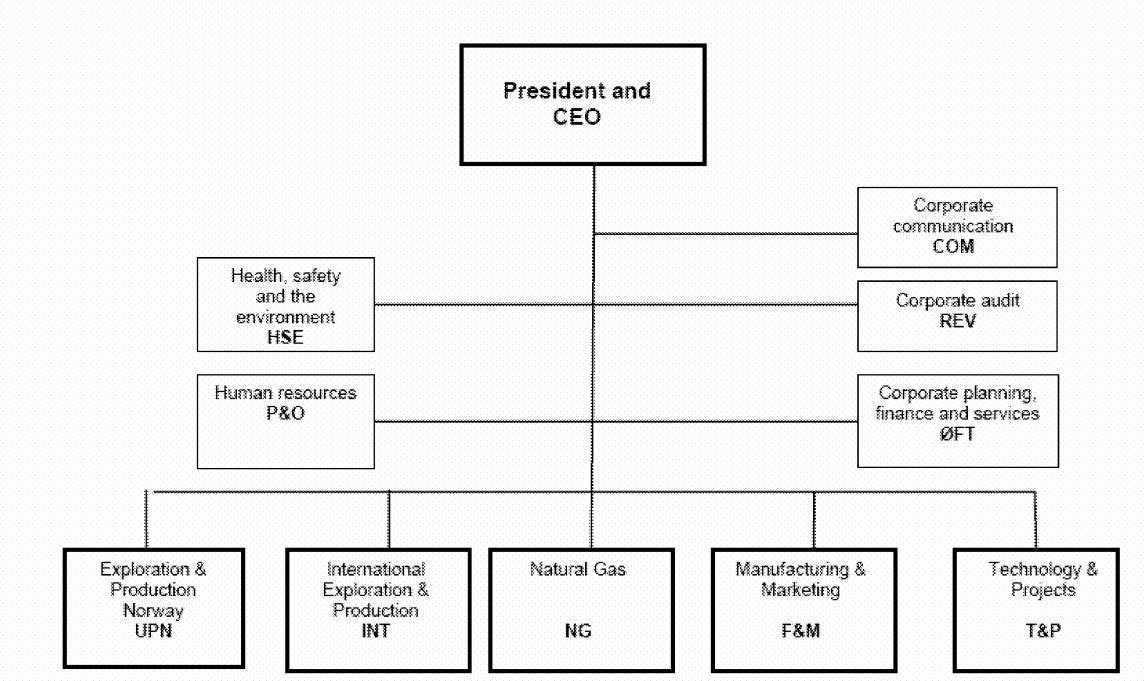

Figure 9 - Statoil Organisational chart

Statoil is organised around five main business units (figure 9). In addition to the parent company, the Statoil group comprises a number of independent legal entities (subsidiaries, associated companies, partnerships) (Statoil ASA, 2006). These are related to the relevant business units/areas and will not be described in detail here.

5.2 The E-collaboration strategy

Several new solutions for IT-supported collaboration have been deployed in Statoil during the latest years. One of the main challenges now facing the company is to ensure a proper practice towards the collaboration processes of coordination, production, decision and workflow in all phases of the value chain. Everybody in Statoil collaborates and hence eCollaboration is important to their business. The collaboration work process is governed by the corporate IS/IT function which is responsible for establishing a strategy for eCollaboration. In this section we will describe the eCollaboration strategy implemented in Statoil more in detail.

5.2.1 Vision

The vision underlying the eCollaboration initiative is:

"Increased value by effective collaboration among internal and external participants"
(Statoil, 2002)

The eCollaboration solution shall increase value creation by enabling powerful work practices and effective information handling in inter-organisational environments. To ensure that the vision can become reality it is constituted of eight desired core capabilities. These are ability, openness, synergy, quality, security, simplicity, accessibility and flexibility.

5.2.2 Strategic objectives

The eight capabilities for collaborative power represent strategic goals to fulfil the vision. Table 6 summarized the eight strategic objectives.

Table 6 - the eight strategic objectives

Objective	Description
Ability	People and organisation trained and prepared for collaboration
Openness	Open communication and information sharing
Quality	Information quality and easy use of practices
Synergy	Utilising diversity in competence and culture
Security	Easy and sufficient information security
Simplicity	Simple and user friendly collaboration tools
Accessibility	Rapidly provide and find the right knowledge resources, tools and services
Flexibility	Flexible collaboration across boundaries

5.2.3 "As – is" analysis

In the project initialization phase Statoil conducted an "as-is" analysis. The objective of this analysis was to describe the use of Statoil's general IT-tools for collaboration and the services provided, and tie this to the result of consolidation of existing solutions. Statoil has comprehensive use of general tools for coordination and production in groups, although they are poorly integrated, and they have comprehensive use of tools for oral communication. Statoil has limited access to and application of tools for group decision support, advanced and automated functions for coordination and production, workflow, tools supporting synchronous communication, multimedia communication facilities and tools for collaboration with partners outside Statoil. The current situation in Statoil was described as follows:

"Despite the fact that Statoil has been in the forefront implementing and adapting general IT-Tools for collaboration, it is still the more individual oriented tools that dominate the scene. The most popular and widely used are e-mail and office support tools, with private folders for information storage. The user frequency and popularity of other tools must be regarded as relatively low, despite large dissemination. Lack of training and application support may be a substantial cause for this, but in addition the users experience the tools as complicated and not very user friendly" (Statoil, 2002).

5.2.4 The lifecycle of information

The lifecycle of information refers to authoring, editing, routing, approving, publishing and archiving of information. Statoil has tools to support all the phases of the lifecycle. The main issue and challenge is concerning integration of the different levels of the lifecycle. The typical example concerning this is that archiving is disconnected from the production process, which in effect makes employees not archive information as instructed by authorities. In contrast, the future requirements in general are related to information flow and management. Further there are identified needs to leverage and utilise existing competence and knowledge through improved collaboration tools, better search functionality and improved possibilities for sharing of information with external partners.

5.2.5 To – Be Principles

To supplement the rather problem-focused analysis of future challenges, the project also did some "blue – sky" thinking on the desired principles of future eCollaboration tools in Statoil (Statoil, 2002). The to-be principles therefore search to address where Statoil want to be after the strategy is initiated and the solution implemented. This can be summarized as follows:

- High accessibility of people and information and extended automation of coordination, workflow and content management tasks.
- A generally heightened skill level, dedicated roles and services for eCollaboration

5.2.6 Recommended initiatives

Based on the eight strategic objectives Statoil developed a set of nine initiatives that fall into three tracks. This includes the tools to make it possible, the services to ensure the practice and the organisation to carry it out (Statoil, 2002).

In general the tools to make it possible constitutes of the following initiatives: (1) A Basic Content Management (CM) solution, (2) Automatic archiving through integration between collaboration tools and basic CM solution, (3) Automatic security level on information based on metadata and project or activity data, (4) Integration of existing standard tools such as MS Office, (5) Internet based workspaces and (6) Project planned workflow.

The training initiatives to enable and support productive collaboration practices and tool usage are mostly related to eLearning modules. This means to provide eLearning training courses, establish eLearning modules for superuser's and best practices for end users. Facilitation services are also included to provide assistance in start up of projects, meetings and workshops and network collaboration. Further the eCollaboration strategy focuses on the development of advisory services that shall help the organisation in choosing the right collaboration tools, services and practices. In general, this means establishing, implementing and continuous improvement of best practices and guidelines for collaboration.

The organisational track focuses on initiatives to enhance the organisation's ability to create value by practicing powerful collaboration. This track is focused within three areas; the co-worker, the service provider and the organisation.

5.2.7 The wheel of collaboration

The set of initiatives may be illustrated through what is called "the wheel of collaboration". This can be viewed in figure 10.

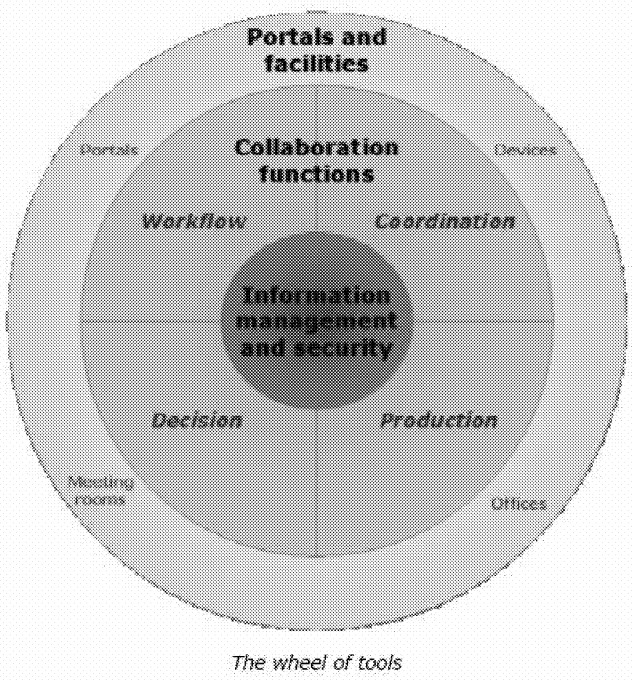

Figure 10 - The wheel of collaboration

The wheel constitutes of three main tracks, similar to the recommended initiatives; one for the tools, one for the services and one for the organization. The wheel contains the main types of collaboration tools, where the information management and security functions represent the "hub" which the collaboration functions rely on. Portals and facilities represent the "tyre" connecting to the "ground" of the collaboration environment. Equivalent to a tyre, the portals and facilities are most likely to need repair and replacement from time to time, but the "rim" of functions and its "centerbore" connection to the"hub" should be more durable. The "hub" itself of information management and security should last many changes of collaboration functions, portals and facilities (Statoil, 2002)

The project handbooks from Statoil (2004, 2005a, 2005b) describes the three deliveries that has been conducted to this date. These phases are based on the previous phases, and build on the learning experiences and recommendations from these phases. There are four phases that have been carried out in Statoil before the implementation project started.

The strategy described above was the first phase; this describes the vision, strategic goals and recommended initiatives for the project in terms of tools, services and organisation. Then a feasibility study was done, to evaluate if the goals could be accomplished, and also to learn about Enterprise Content Management. The results from this phase identified which initiatives should have the highest priority during the project. A new and more detailed feasibility study was done, focusing on the architecture and content model in the solution. Based on this study, Statoil could choose one of the eight alternative solutions presented to them during this phase. The fourth phase was a Request for Information, and recommendations and conclusions from this phase led to the start of the implementation project.

The three deliveries constitutes of a detailed project plan that describes the given project period with background, goals and scope in addition to roles in the implementation project and the tasks and activities assigned to these roles.

The goals for the project are presented in the first project handbook (Statoil, 2004). These are divided into effect goals, object goals and process goals. The effect goals are related to the processes of collaboration, management of information and the main capabilities of eCollaboration. The object goals are related to the Statoil corporate solution. These describe the actual technology that needs to be implemented to reach the initial strategic objectives. The process goals relate to the process of implementation. These describe the organisational abilities that must be obtained if the project shall succeed. Our research mainly focuses on the effect and process goals.

5.3 Collaboration@Statoil: the solution

The solution contains many different tools and technologies. The structure of the solution with the tools is illustrated in figure 11. The figure presents the categories of tools, and a brief presentation of the most important tools, to get an overview of what technologies are present in the solution, and what the different tools can offer the employees and the organization.

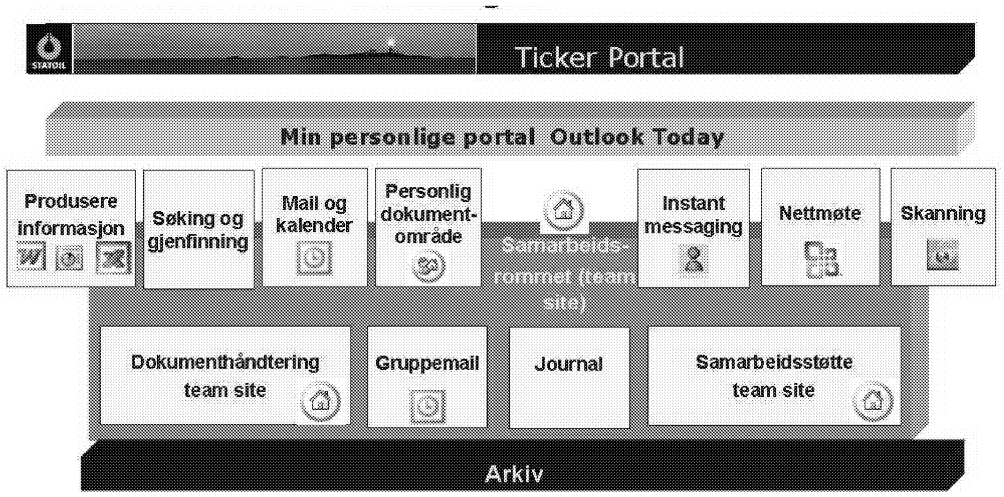

Figure 11 - The structure of and tools in Collaboration@Statoil

5.3.1 Tools for collaboration

Collaboration between employees is an important feature in Statoil, and many of the employees' tasks are dependent on exchanging information with others in the organisation. The strategy (Statoil, 2002) describes that openness in matter of communicating with people to find specific skills or knowledge and to be able to share information is important in collaboration. The tools that support collaboration in the solution are for creating and exchanging information with others in the organisation. The tools here mainly belong in the Microsoft Office System, which is a collection of multiple programs, servers, services and solutions that support teaming, process management and use of information (Microsoft, 2006).

Microsoft Office 2003

Office contains different tools for creating and editing different types of documents, for example Word, Excel and PowerPoint. The users can create documents directly in document workspaces, and choose between different templates and file types or upload documents to document workspaces from their workstation. Once a document is made available in such a

document teamsite, other members of the site can read and edit the documents using the different Office tools dependent of the file type.

Outlook 2003
Outlook is an integrated solution that provides possibilities for each user to organise and plan their own work days. Through the solution the users can send and receive private and group e-mail messages, but they can also organise schedules and tasks, notes and other information. The schedule can contain information about when a user is busy or available and can be viewed by other users as well as themselves. This can be helpful when someone is planning a meeting or allocates tasks, and can save time in planning and synchronising.

Windows Messenger
Windows Messenger is an IM application that allows users to communicate with each other in real-time. Each user of Windows Messenger has a contact list, and the users can use this list to easily see whether their contacts are online or not. When the person you want to contact is online and available, you can send brief messages which will reach the receiver instantly, and so the application is suitable for questions which require quick answers or clarifications between users.

Office Live Meeting
Live Meeting enables the users to collaborate online with colleagues, customers, and partners in real time, being either individuals or groups. In addition to real time communication, Live Meeting also provides the opportunity to share documents and applications with other participants of the meeting. This can allow users to review or work on a document together, discuss information or make decisions even though they are not on the same physical place.

SharePoint
SharePoint enables enterprises to develop a portal to connect all users, teams and knowledge for users to take advantage of relevant information and knowledge across the organisation to help them complete their tasks (Microsoft, 2006). This feature might be the most visible part of the Collaboration@Statoil solution. SharePoint contains teamsites and personal sites where the users can work, both in groups and private.

A teamsite supports collaboration and content management in groups, for example a business unit, a project related or task related group. Most users work in several teamsites, a list over each user's teamsites is included in Outlook today, as is the link to each of these sites. A teamsite can contain several elements, depending on the team's needs (Statoil, 2004):

- Manage documents: each teamsite contains a document library for production and sharing of the team documents. There can also be different document workspaces for production of specific documents or document groups.
- Manage tasks: tasks can be used to describe, allocate and control status on tasks related to team activities.
- Manage meetings: a teamsite can contain meeting workspaces, which is used together with the schedules in Outlook to plan and manage meetings. A meeting workspace can also contain their own document library, where documents related to the meeting, such as agenda, presentations and meeting reports are stored.

MySite is a personal site for each user of SharePoint in Statoil. This site offers the users possibilities to produce content that is not project or group related. Just like teamsites, MySite

can contain document workspaces, and the owners can choose if the content in these sites should be visible to others or not (Statoil, 2004).

5.3.2 Tools for web publishing

The tools in this category are to publish content on the organisation's web sites. basically they makes it easier to structure the content and the layout on the site, and simplifies the publishing process.

MS Content Management Server
Content Management Server is an enterprise web content management system that makes content authoring and delivery easier (Microsoft, 2006). The tools included in CMS makes it possible to create, publish and store content, develop web sites, deploy web sites and content and ensure scalability, reliability, extensibility and interoperability.

CMS Template Explorer
Maintaining the look of web sites can be difficult when many people are involved in the content publishing process. Template Explorer provides a solution to standardise the look across a web site, by predefined templates which can not be changed by authors (Microsoft, 2006). All pages based on the same template will be alike in terms of design and layout. This will probably save time and effort for the authors and publishers, and also provide a more holistic impression of the organisation's web site.

5.3.3 Tools for search and retrieval

A big amount of documents and other content is produced in Statoil every day, and for the employees to be able to use this information it has to be easy to find. Collaboration@Statoil provides a new tool for search and retrieval of information that is described as the essence in the new solution. The search tool is part of an answer to the demand of traceability in a large international and publicly listed organisation like Statoil. This tool should be able to find information independent of where the content is stored; either this is teamsites, intranet or the new archive solution.

FAST
FAST provides a single point entry to search all the content in the organisation, both internal and external sources can be integrated with FAST Intranet Solution. In Statoil the search tool can find information in following information sources: Intranet, the new archive solution, teamsites, personal work surfaces (my-site), selected Notes data bases and selected file server sources. The tool offers two different ways of doing a search; one basic search where the users type in simple keywords. And it also offers one advanced search where the users can define their search by choosing among a certain amount of alternatives, for example content linked to a project, author or period of time.

5.3.4 Tools for content management

As stated above, there is a lot of content being produced in Statoil every day. Management of this content is important, through the whole lifecycle from creation to filing or disposal. Statoil (2002) argues that they have had tools that support this in previous solutions, although

a lack of integration between the phases led to infrequent use related to document archiving. The new solution is therefore related to information flow and management.

Meridio

Meridio is an Enterprise Content Management (ECM) system that provides electronic document and records management through the lifecycle, from document creation and modification, to record declaration, retention and disposal. It provides storage to content from different sources. The functionality is provided through the interfaces in Microsoft Office System described above. Collaboration on documents and records are facilitated in SharePoint through Meridio.

6. Results

This section of our report presents the findings from the thirteen interviews conducted at Statoil's head quarters. This chapter will be presented according to the different categories chosen in the analysis phase. The categories are chosen based on the information gathered before the interviews in the document analysis phase and the information given in the interviews.

6.1 Effect goals

The effect goals are formulated in the three project handbooks we have analyzed. In this section we have summarized the main effects identified in the Statoil case.

6.1.1 Simplify the collaboration and content management process through integrated and simplified tools, methods and services

This section will present the results related to perceived ease of use, perceived usefulness and integration of the different tools in the solution.

Perceived ease of use (general)

Perceived ease of use is seen as one of the most important variables leading to usage of information systems. If users find a system easy to use it is more likely that they will perceive the solution useful in their work process which in terms may lead to increased usage. Perceived ease of use is defined as one of the key strategic goals in the eCollaboration strategy. Further it constitutes as a central part of the first effect goal which is stated above. To find out whether the solution is user friendly or not we asked the respondents what they emphasize with perceived ease of use. A Record and Information manager emphasizes this:

"I associate ease of use with MS Office […]The user interface is ease of use for me, and maybe the solution is not Office in accordance to function keys and so but the environment is known […] one can use Word, Outlook and other Office products."(Respondent 6)

This view indicates that PEU is associated with something known. This may be a known environment that the users are familiar with and use actively in their everyday life, at work or at home. This view is strengthened by the end users, and there seem to be a rather mutual agreement that the most important issue concerning a new solution is that it is intuitive. This is expressed by the following end user:

"The first thing I emphasize is that it is easy to get into, easy to learn, easy to use, that it is not necessary to pass several courses and stress to make things work. Secondly I think it matters that the system does what you tell it to do and it does it fast […] The solution meets these requirements quite good, I have nothing to complain about"(Respondent 9)

A superuser states:

"It shall be relatively self-explaining. By that I mean that one does not have to dive into fact sheets and manuals. Like […] when I go in and work in a system it is easy to understand what to do" (Respondent 10)

With foundation in the above statements it seems obvious that the users have a rather similar impression of what PEU is related to. When knowing what they emphasize in the term it is easier to gain an impression of how they see the solution in accordance to it. However, none of the above statement give any indications on whether there are elements concerning collaborative systems which differ from more traditional Information systems. One user illustrates PEU from a more collaborative point of view by stating:

"Ease of use is that it is easy for me to create a document, send it and receive an answer on my request". (Respondent 7)

In accordance to how the solution actually meets these aspects of PEU there are different opinions. As one member of the core project group states:

"What is very good in the new solution is the common user interface, every teamsite look a like. There are built in navigators and it is arranged for teamwork. A common calendar so that everyone can keep themselves up-to-date, and the possibility to use linking for common values I believe is very good. It is a good structure, and if I open a teamsite it gives me very much information about the work being done there". (Respondent 5)

The above statement is to a certain degree confirmed by a superuser:

"It is positive that everything looks a like in the solution, but it is also very easy to get lost in this world". (Respondent 10)

Others users think the Windows based user interface make it easy and straight forward to use:

"I think it is user friendly, it is Windows based something that makes it an easy and straight forward solution to use". (Respondent 13)

The above statements indicate that the solution to some degree meets the user requirements of PEU. The statements also indicate that PEU is very closely associated with the structure and user interface of the solution. Seeing it this way the new solution has contributed to a change in structure. This because they have moved away from the notes based database systems to an Intranet web based solution. Concerning this a very important aspect of PEU is brought up by the end users. One superuser illustrates two views on the same matter:

"There are too many links and too many clicks, I think Statoil will notice this on a sickness statistic sooner or later, because we click noticeable more than in the prior solution. So it may seem like a weakness that one for example has a link to a teamsite, then you paste this link in a mail. When you click on the link you go directly to the document, which make you directly involved with the document metadata, and then you have to click again or check it out. This is an obvious weakness. The strength however is that everything in time is web-based and that one can use links to anything, anywhere."(Respondent 8)

This is further underpinned by another superuser:

"I see that new employees in Statoil manage this new solution easier because it is a web-based user interface and they know what to do. They know that it's not dangerous to click and try to see different aspect of the solution". (Respondent 11)

This indicates that it is easier for new and younger employees in Statoil to use the new solution. This because they are not that in-grown with the prior solution or as some respondents argue a web-based user interface is more familiar to the younger generation than to the elder one. It is argued that the web based user interface give the elder employees a higher threshold of learning the solution than the younger ones. This is something that is further confirmed when users are asked whether they think their colleagues manage usage or not. One superuser argues why she does not think everyone of here colleagues manage use of the solution:

"I work in an environment with rather grown people, and it is evident that we have a higher threshold of learning than younger employees that are more familiar with computers. That's just the way it is, we need a little bit more time, and more help". (Respondent 10)

According to how good end users manage use of the solution there are many different opinions. An indication is like stated above made around age and the threshold of learning. Despite that most of the core project members has a mutual opinion that they manage to use the solution in a good manner, one member of the core project group makes a distinction in relation to the learning curve mentioned above:

"There was an underlying factor that this solution should be very intuitive, it was. But unfortunately it did not become like this, it demands quite a lot from the end-users, which have different competence in relation to usage of IT tools generally. (Respondent 5)

So it seems to be evident that the learning curve for the solution is rather high. This view can be further strengthened by the trend that the end users that have gone through superuser training and the employees directly involved in the implementation project also seem to be the users who manage usage in a good manner, although they also highlight aspects of the solution which is more difficult than others. It seems like especially Teamsites and working with metadata are elements that are hard to learn and use in a proper manner, much because it is a completely new way of working in contrast with the earlier Notes systems. However, it seems to be a mutual agreement among the respondents that they do not think their colleagues manage use of the solution.

Integration

With integration we think of how well the different systems included in the solution are integrated to one whole, in short words how well they communicate with each other. One member of the core project group describes integration from a technical point of view:

"The challenge facing integration is that we have software from three different suppliers (Meridio, Fast and Microsoft). They are integrated to a certain degree because they speak together. Fast and MS goes very well together, but we have an old Notes system with us. To make these things function from an IT point of view one has to program and rewrite the things Statoil want which the supplier does not take responsibility for. This makes it difficult to maintain". (Respondent 1)

This indicates that integration can be viewed from different perspectives. As the respondent above states there are central technical challenges associated with the integration. On the other hand users do not have the competence to know about these challenges and focus merely on the issues relevant to them. This becomes integration in terms of how easily they can navigate between the different aspects of the solution. Earlier we mentioned that there

was a challenge related to the web-based interface with too much clicking. This issue is also brought up by end users concerning integration. Further the answers differs, some think it is well integrated, some don't know and some seems to relate integration to how well the solution fits according to definite aspects of their work processes. For example one record and information manager emphasizes mail management with relevance to integration:

"I do not know if the tools are proper integrated. But now a new version is coming and there something called mail management was going to be included. Users have executed work and stored their case work in their mail boxes, then Outlook with limitations on storage is implemented and they get despaired. Then mail management is promised so they can be able to empty their mail boxes which further shall be integrated to the teamsite and down to the Meridio archive"(Respondent 10)

The mail management issue is highlighted by many respondents. It seems like a limitation to their mailboxes combined with a lack of integration with the teamsites is an unfortunate combination. Despite of the limitations and challenges brought up in regards to integration above several users underpin that they think the tools in the solution is well integrated. However, most of these haven't stated any examples in regards to this so it is unfortunately not possible to document it necessarily.

Perceived usefulness

As both stated in the corporate eCollaboration strategy, project handbooks and preliminary meetings with our contact persons in Statoil the users' perceived usefulness of the solution is of great importance. If the solution give meaning in the employees day to day work, they are also more likely to use it actively. The implementation of the solution has brought a significant change to the employees work processes in Statoil. This fact also seems to be emphasized by the interviewees when they were asked questions related to how useful they perceive the solution to be. This is illustrated by the following statement when asked whether the solution has had any effect on collaboration:

"Again, my belief is that tools are subordinates and that things are more related to work processes, work routines and that types of things. If one had invested as much time and money with IBM and Notes as one has done with Microsoft I think one would have obtained something similar. I will therefore not say that everything with Notes is wrong and everything with teamsites is good. I still believe that routines are a central element in this, and we have intensified these very well" (Respondent 1)

By implementing the collaborative solution Statoil want to obtain more effective collaboration among both internal and external participants. The users who participate in external collaboration seem to be pleased with the opportunity to easily participate with external participants, and it is highlighted as strength that the prior solution did not provide.

Like the member of the core project group stated above the core project group has focused on intensifying several routines when implementing the new solution. The major reason for this is to provide a more intense focus on collaboration. One of the intensifications that underpin this is the limitations brought down on the employees e-mail accounts. This initiative has gained a lot of attention by the Statoil employees, both negative and positive and seems to have brought a significant change to their work processes. The issue concerning limitations to the users e-mail accounts is described by a member of the core-project group:

"In relations to the limitations on the mailbox one now has to apply increased capacity if this needed. Then one will be called in to conversations with the IT manager in the unit. There they have to argue why need it, how they work and what is best practise. If they are convincing enough they will increase the mail capacity. Other units are stricter and say that the employees must be happy with what they got, and that's it. The main issue is that one is trying to be strict and guide the users to try other possibilities provided by the solution" (Respondent 1)

An effect of the intensified routines related to mail is brought up by an end-user in Statoil:

"We have gained an increased focus on the collaboration process, that we work together and with others. This has led to an increased level of attention to the problems surrounding the users e-mail accounts. The problem concerning that when you work in your mail inbox you are the only one with access to the information, but by assuring sharing both in the current work-situation and in the long run I think we have increased the focus on collaboration in Statoil." (Respondent 11)

Increased focus on collaboration seems to be one of the effects provided by the solution. An underlying factor supporting this is the effect on the role of the record and information managers. It is argued that by increased focus on collaboration one has also increased the focus on the role of the Record and Information Manager (RIM). The importance of this focus is brought up by one RIM who argues:

"The new solution has brought focus on my work, and I believe that is great. Earlier I got suffering looks when I said I was an archivist, because people think of that as an old man standing in the basement with white gloves and book. So information administration, making sure we have a good archive and that everything is administrated in a good manner is an expense. We do not produce anything and is only an expense, but extraordinary handy when it is a need of finding something. So focus on having tidy documentation, at least when we have this new demand on retraceable information is important". (Respondent 2)

The users' perceived usefulness of the increased intensification of routines however differs. Despite the increased focus on collaboration it seems like many end-users still have difficulties in acquiring a new way of working. An end-user describes this issue:

"This interaction is hard to obtain. I think that is a challenge, and maybe also a mental challenge because many places in this company we are used to work on our own to a large degree, and this is something we also continue doing to a large degree. There are many who store their presentations on their f: disk and this has to do with the degree of control and availability to do. So obtaining interaction is something I think is very important, but it is possibly a longer sheet to bleach". (Respondent 7)

This statement highlights several issues concerning the perceived usefulness of the solution. These are interaction/collaboration, availability/accessibility and time. Increased accessibility to information and resources was according to the eCollaboration strategy one of the major objectives. It is also evident that this is an issue most of the interviewees highlight when asked about their perceived usefulness of the solution. As one member of the core project group states:

"The difference lies in integration of the different parts, accessibility to information or people. To be clear that one can speak to people on other channels than mail or telephone. The solution has contributed to this. I think this will have effect on the organisation. I think there have been more focus on it and a greater focus on the issue that this is important". (Respondent 4)

This statement is further underpinned by another member of the core project group.

"I think that on a long term it will cause considerable better collaboration, at least that part of collaboration that deals with exchange and accessibility to information. Today we got a lot of home-made systems used to exchange information. From Notes to Excel-sheets, Word documents and tailored Notes databases. The new solution will provide users with better opportunities to keep themselves orientated". (Respondent 3)

These quotes indicate that the potential provided by the new solution to a large degree is there, and that the solutions provide great opportunities to the issues concerning increased availability of information and resources. In terms of this the coordination tools and tools for retrieval and search of information is highlighted as functionality of definite importance; in general Teamsites, search and Calendar. On the other hand they speak about effects related to the future. This is something that indicates that at present state the solution has not provided the organisation with the intended benefits related to accessibility and collaboration. This issue somewhat seems like a pretty mutual opinion which is further confirmed by the end-users. The time dimension is therefore brought to the field and must be seen as an important factor concerning the solutions effect on collaboration. The following statement underpins this:

"The possibilities may be a lot better, but today I do not think that we exploit them. We try our best to make it work, at least at the level we did with prior solution. But I do not think that we exploit the possibilities that lies there, and I think it has a huge potential for improvement" (Respondent 9)

This is further strengthened by the following end user:

"We implemented SAP from 97-2001, and it is at this point we can start to obtain benefits from this. So by thinking the same way there are possibilities that this may improve and make things easier. But when we have so many employees, success is dependent on that users manage the collaborative solution equally. If they don't manage use one will have to invest just as long time in getting people using it the right way as implementing it. I think that is where we are now. People find it heavy to use." (Respondent 8)

Usage is here brought up as a central element. As stated above the change process has made changes to the employees' work processes. The statement indicates that the end-users need to use the collaborative solution in an equal matter if Statoil are to obtain the potential effects on collaboration. This view is strengthened by one end user who states:

"There is potential for improvement, but there are certain assumptions. Everyone must be able to use the solution [...] until the point where everyone uses the solution equally and to the same things the solution will not function in an optimal manner". (Respondent 8)

The statements made above make indirect assumptions to whether Statoil has obtained more effective collaboration among internal and external participants. Despite of this several respondents highlighted that they see the potential in the solution in that it will contribute to groups and persons working together by having information in one place, something that probably would increase efficiency. In regards to this one member of the core project group states how the solution contributes in the everyday work:

"The solution makes it easier for me to carry out my tasks. By separating teams and tasks, I've got different rooms for different teams and tasks, different entrance portals and it is necessary to make a distinction between these. This makes me able to distribute information to the ones I work with without inflicting unnecessary information upon them" (Respondent 5)

This statement presents that the solution at this point has led to a better way of structuring and distributing information which further has removed unnecessary workflow of information. This statement is underpinned by another member of the core project group:

"It has contributed by having a better structure than before. Before the systems was more individually based. It is a challenge to get away from the earlier practices where it was normal to store information on f: disk, my documents and so…It is a threshold to let go, but I think it has contributed in terms of having information accessible. When people ask me for information, I know it is present at an actual teamsite, and I can easily send them a link. Then they can easily navigate their way to the information themselves. The solution has far more accessible information than any other solution I have used". (Respondent 3)

Summary perceived ease of use and perceived usefulness
In table 7 we summarize our results in regards to perceived ease of use and perceived usefulness.

Table 7 - Summary perceived ease of use and perceived usefulness

What is perceived ease of use: The general view among the respondents is that perceived ease of use is that the solution is easy to learn, easy to use and self-explaining in means that one does not have to dive into help resources to make incorporate the tools into their work processes **Perceived usefulness:** The users' impression of how the solution supports their work processes. Perceived usefulness is very much related to perceived ease of use.	
Factor	**Findings**
Structure, user interface and navigation	• Standardised look • Web-based user interface • Common (Microsoft Windows based) • Use of links rather than attachments • Too much clicking • Complexity through a wide range of different tools and functionality • Lack of hierarchy, based on metadata • High threshold of learning
Integration	• Good logic in Integration among the different parts of the solution • Lack of mail management between Teamsites and Outlook • Maintenance problems due to integration with legacy systems
Functionality	• Individually based tools perceived as simple and user friendly; in

specific	general MS Outlook, calendar and Instant Messaging. • Teamsite as common sharing space • External Teamsites for easier external collaboration • Common MS Office based production • Restriction to mailbox • Higher threshold of learning for collaboration tools; in general teamsites with underlying functionality

6.1.2 Implement Statoil best practice for collaboration and enterprise content management

Implementing an enterprise-wide eCollaboration solution is, as previously stated a major change process. This includes major changes to the employees work processes. To assure that the change process was conducted as painless as possible Statoil faced a serious challenge in forming and implementing best practices for collaboration and enterprise content management. In this section we will provide insight into the experiences the interviewees have with best practices (BP). In this section however we found it necessary to do a distinction between end users and members of the core project group. This particularly because most member of the core project group actually has been active participants in forming best practices.

Core project group

Every member of the core project group state that they use best practices actively and the basis in Statoil is that everyone is bound to use best practice. This is confirmed by a member of the core project group:

"I have to use best practice. I am bound to use them, firstly through my job, secondly because I am an employee in an organisation that gives me guidelines they want me to follow, and then I follow them. It's not a question, its loyalty to the organisation". (Respondent 5)

There seems to bee an agreement on whether the best practice satisfies needs among the core project group interviewees. Since many of these interviewees have been directly involved in the implementation project they naturally try to see best practice from the end users point of view. In this case it is stated that they think best practices satisfy needs, but they could possibly be formed in a less comprehensive matter. This is underpinned by the following statements:

"They can be formed in an easier fashion. One of the limitations to best practice is that there is formed several different possibilities for what kind of meeting one shall have. One can do it that way or that way. There are so many opportunities that we had to implement different choice matrixes depending on what users shall use it for […] I think this is related to Microsoft's philosophy which states that there are several roads that can lead to one goal". (Respondent 3)

The above statement indicates that the best practices illustrate too many ways of doing the same thing. For experienced users this may not be a challenge, but for the normal end user with limited experience it may have a confusing function. This is confusing because one does not have enough experience to make a distinction between the different alternatives. From this perspective a member of the core project group suggests a more focus towards a clearer definition of the processes.

"[…] there is a wish from the specialist environments on a clearer definition of the processes. The processes are possibly defined on a too high level, and this makes it difficult to follow. This because the metadata reflect the process, and when the users don't recognize themselves in the metadata definitions on the teamsite, there has to be a limitation one place" (Respondent 5)

The importance of this focus is further strengthened by a RIM:

"Best practices are not developed by the ones who work within the heavy processes. Unfortunately they are developed by people with computer associated background. I know that other have read them, but I do not think they have been able to incorporate what they really has been doing because they do not know how to use the systems. I therefore do not think that the recommendations lying in best practices are formed well enough according to the problems people will face in their day to day work"(Respondent 6)

Despite that members involved in the implementation project see limitations in the best practices there seem to be a mutual agreement that BP is necessary to gain evidential effects from the eCollaboration solution. Saying this there is an underlying assumption that the best practices are being used. As on member of core project group says:

"To affect efficiency and productivity I think best practices need to be passed on again an again. One needs to take some rounds and to emphasize that they exist and that they shall be used". (Respondent 4)

The above statements indicate that best practices is very important to Statoil, and if used properly one will reduce time spent in making decisions on how to do things, and moreover being able to use time to actually work. The major challenge concerning best practices is to adjust them necessarily and to make them easily accessible so that people know them, read them and use them.

End users

As earlier stated it is logic to believe that there is a distinction between the end users and the core project members' views and experiences on BP. We will here go through the experiences and views informed to us by the end-users.

There seem to be a rather mutual consensus concerning the importance of BP. This is highlighted in the following statement:

"In an organisation Statoil's size best practices is necessary. Either if it is called best practices or something else, I think the organisation needs these guidelines". (Respondent 12)

This statement is expressed in a more in depth manner by another end-user.

"Best practices are necessary because we shall work /interact with the solution equally. To make a statement like, this is how we shall work, is very important to a group working together". (Respondent 10)

Another end user is more flexible in his/hers explanation of the importance of BP:

"In some areas it is necessary, but it can also be too much. But in the end good advices won't hurt you […] by too much I mean that I get tired if someone is going to tell me in detail everything I should do. It may be that the way I chose to do it works as well for me as any best practice would do" (Respondent 9)

Further the results provided by the end users somewhat reflects the challenges stated in the previous section where we have documented the results from the users involved in the core project group. It seems like there is a rather mutual expression concerning the way BP are formed. This is related to the BP focus areas. One end user underpins this:

"When I go into the best practice documents, I see that they are more or less formed as recepies for how one in a technical manner may check a document out or in, or how you may attach a comment or copy a link. A best practice documents should rather describe how you can do a definite task or work process" (Respondent 8)

A RIM further states:

"I think the information provided is too much for most people…there are several opportunities and the best practice documents describe every single one of them, or at least very many even if the user only is in need of two. Seeing it this way I think the documentation could be better, but I know them and use them actively (Respondent 11)

The statements above will to some degree confirm the challenges stated by the other respondents in the previous section. It seems like many of the end users miss a more definite relations to their day to day work processes. So when BP is focused more on the technical possibilities related to the solution than the actual work processes it may actually work against its cause in some cases. This problem is underpinned by the following statement:

"Best practice is something I do not know enough about to use…it is to difficult and time consuming". (Respondent 7)

This argument is followed by another RIM:

"There are many fact sheets, but the problem is that these are pretty complex, and there is an entire new system of concept and people have problems understanding the different notions related to this". (Respondent 10)

The above statements indicate that the complexity and formulation of BP may have a considerable effect on whether they are used actively or not. If the competence and knowledge that makes the users able to use the solution in a proper manner is not in place they may find it hard to actively involve BP in their day to day work. This because BP seems to be formulated in a technical matter that makes it hard for the users to make a distinct connection to their daily work processes.

Summary best practices

Table 8 summarizes the findings related to the best practices implemented in the organisation. These are divided into the categories focus, necessity, usage and additional information.

Table 8 - Characteristics best practices for collaboration and content management

Factors	Findings
Focus	• Too technologically focused, illustrates too many ways of doing the same thing • New system of concept makes it difficult to relate BP to day-day work
Necessity	• Common understanding of the importance of BP in an organisation Statoil's size
Usage	• Core project member manage usage of BP and thus BP satisfy needs, but they have experience through involvement in the core project • End-users manage usage to different degree, thus satisfaction differ.
Additional	• Experience with solution affects ability to use BP • BP need to be continuously distributed throughout the organisation

6.1.3 Ensure auditable (and quality) content management throughout the entire content's life cycle and the entire collaboration process

The goal is to support content management throughout the entire lifecycle and collaboration process, and ensure that content is auditable and of good quality. This section will present the results related to content management.

Content management

As mentioned, and as appeared in the interviews several times, the solution has helped to address the issue of information administration. Especially the people who have job tasks related to these issues did emphasize this. This whole new focus also results in new ways to carry out and structure work processes, and this is much related to the content management process.

"The use of teamsites and to have the documents in one place, and maybe also go back to look at the editing which have been done [...] I work a lot with these types of documents which live and move from one person to another, and in those cases it is very nice to be able to see the history" (Respondent 12)

The effect goal describes that they want to ensure auditable content management throughout the entire lifecycle. We have asked the interviewees what they think of this, whether the solution supports the lifecycle in a good or bad way. The answers that are consistent are that the solution supports the process, but the brand new way of working compared to the old solution results in that the full potential of what is being offered is not present yet.

"The solution supports the lifecycle, but it is not yet incorporated how to really do it. But the solution supports Statoil's requirements for how to handle documents, although the people haven't really taken it yet. But when they get it in their fingers, the solution will support this very well. I can't describe it as anything else than that this becomes rather a template for how to handle a document." (Interview nr 6)

This illustrate that there is potential in the solution, but as mentioned before, the new structures and work processes take some time to incorporate. But although they haven't started to use the functionality and all the possibilities that are present, it seems like they are aware of the potential, and they pretty much know how the content management ideally would work. An end user describes the process as follows:

"Ideally I would create the document in the teamsite, and they [colleagues] would comment it directly, and so that I can see the history and read the comments. But present time I guess it would happen by sending the documents forth and back. […] This also shows that we haven't yet fully used this possibility." (Interview nr 12)

The last step in the document lifecycle is the archiving process. The teamsite is closely integrated with the Meridio archive, and one of the main goals in the solution is that it should be easy for the users to send their own documents to the archive.

"When the archive works, we have an archive function which is unique, simple as that. It takes two keystrokes for a user to file. […] It is unique, not just in Norway, but pretty far outside the Norwegian borders." (Interview nr 2)

This quotation illustrate that the integration between teamsites and the archive is well perceived by users, and that it is quite easy to file a document if you just know the process. But we have also detected a few problems with the archive. A problem mentioned by many of the interviewees was the lacking of quality control before a document is filed. A user describes the problem this way:

"Today you are allowed to file a document as draft, and I think that is bad, there should at least be a warning when you do. […] A filed document which is a draft gives the archive bad quality" (Interview nr 2)

In addition to this, there are also some users that mention trust as an important issue when working with documents in teamsites. According to the data, all the members of the document workspace have the same rights to the documents, and all of them can easily change or delete documents created by others. This makes a dramatic change from the situation they were used to, when all information were private. And this also makes trust an important issue when using this new solution.

"People have to be very aware that when we work in teams, we are a team working with the same information, we are not individuals. Some are a bit surprised that other people can delete the documents you have uploaded to a teamsite. […] This is the team's information, and everybody has the same rights, this is a challenge to some." (Interview nr3)

The solution support more open document administration, through the teamsites and document workspaces. By storing the content in the teamsites the basis is set for having all team-related documents in one place, something that make it easier for members to get information access when they are in need of it. Additionally it makes it possible to keep track on the latest version of the documents.

"It is really vital, that when you work in groups or projects, the information is not private. This means that correspondence between my colleagues and others in the organisations may be of importance for me as well, and this is a nice place to look and find information. […] I would rather say that it is this enforcement of the routines, and that it is so hard to keep information to ourselves that makes this so good." (Interview nr 1)

The limitation on the mail inbox has been mentioned above, and we saw in the interviews that this change has got a lot of attention, and also caused a lot of changes in the work processes.

As the quotation above describes, the limit on the mailbox together with changes in routines, makes it harder for the employees to keep information to themselves. Instead of storing information and documents in their mailbox, they now have to store it in the teamsites so that the content is shared with other members of the teamsite.

Summary enterprise content management
Table 9 summarises the findings related to content management. We have divided the findings into structure, life cycle support, archiving and document management.

Table 9 - Characteristics Enterprise Content Management

Factor	Findings
Structure	• Shared space and routines for document collaboration makes it difficult to keep content "private", something that increase focus on collaboration and that content is the "team's information"
Life cycle support	• Supports the content lifecycle, but people haven't incorporated it fully yet • Adoption closely related to individuals work processes
Archiving	• New archiving functionality makes it easy for users to archive information • Lack of control in terms of document status makes drafts possible to archive
Document management	• Good possibilities for commenting documents • Every user has same rights to administration of documents. Different opinions towards this issue.

6.1.4 Improve search and retrieval process from defined information sources to ensure sharing and reuse of information

The search and retrieval process is one of the key elements in the new solution. In the eCollaboration strategy there are formed strategic goals with focus on the search and retrieval processes. Increased accessibility to information and content is seen as a "cornerstone" in the new solution.

Search
The search engine was visioned to be one of the cornerstones in the new solution, providing an easy and sufficient way of finding information. One RIM underpins this:

"I believe that the search engine which makes it possible to find everything that is available in Statoil is of great importance. To me and my job situation this is the most important element in the new solution" (Respondent 2)

The importance of having a search engine that finds necessary content in a large enterprise like Statoil is highlighted as very important by users. However, our results highlight that it is one main problem concerning the search engine that reduces the actual potential provided by the search engine at present state. This issue is highlighted by the following quotations:

"[...] I think the search engine seems very good. In fact it is so good that when you search you retrieve so many hits that you need to learn to search in a very definite manner to find what you are looking for, because it is looking in so many places". (Respondent 10)

"It is ok that I can go in and put in search words, but most of what I retrieve is not useful to me, so I do not think it is a quick way to find what I am looking for […] It becomes too much, most definitely. Too much noise, I can't find the needle in the haystack". (Respondent 7)

Illustrated by the views above you get one group who think the search engine it is very good, and one who thinks it is not. This indicates that, despite of the different views stated by the users, there is a common problem facing the search engine at this state. This is the fact that the search engine is so strong that it actually finds too much information. Indeed there are possibilities incorporated in the solution that makes it possible to restrict the search; in general by setting criteria's, but there seem to be a high learning curve concerning the issue of drilling down into the information. The issue of drilling is further related to the metadata based structure incorporated in the new solution. By using metadata as criteria for drilling down to information, one obvious goal is to make it easy for the users to search and find information easily. This however has worked somewhat against its cause because end users seem to find the metadata world problematic. The following respondent underpins this:

"[…] when hundred of people shall attach metadata to their documents maybe only ten use the same type of metadata on the same documents. This is problematic and I don't see at this point how we can solve this problem […] the FAST search engine is very good, the problem is that it finds so much it is not supposed to find". (Respondent 10)

"I would say that it is easier to search on SOL or Google, you get too many hits, but on the other hand you may refine the search […] something which reduces amount of hits, maybe from 500 to 100, but then you do not understand the metadata string showed" (Respondent 8)

The above statements indicate that there is an underlying challenge related to the employees' individual and subjective behaviour. People think differently and therefore use metadata definitions differently. This leads to a huge amount of unnecessary hits when using the search engine which in terms lead to much time spent in searching and less time spent in working with the information. There is therefore stated a wish for more deliberate behaviour in terms of what kind of information that is appropriate for the archive.

Accessibility

Concerning accessibility to information we meet many of the same issues that are discussed in the prior section on search. The search engine is very good, but finds too many things, something that may be closely related to metadata. Despite of this there are different opinions on whether the new solution provide better accessibility or not. A member of the core project group stated in the section on perceived usefulness that the solution provides much better accessibility to information than other solutions he/she was familiar with.

As prior stated the FAST search engine is very powerful. This does not only involve it finding a lot of information. It also involves it finding information that should be confidential. This presents a new challenge that is described by a RIM:

"[…] the meaning was to obtain a more open working day in that we could cross-search and find information, because we do not exploit our information good enough. What collaboration has led to is that information has become more protected, because we now have only one archive. When you search in one archive and get access to information you really not is

supposed to have access to, the technology has changed the focus [...] We protect our information more". (Respondent 2)

This statement is underpinned by a superuser:

"People have experiences that confidential information, either on personal level or other suddenly is in front of them. This has resulted in that people in our unit make the content protected. And it is evident that if that teamsite contains a small number of users, there will also be a small number of users who owns that information in ten years". (Respondent 10)

Confidential information should not be accessible too all users, and it seem to be a considerable agreement among users that neither employee has a need to access every information available in Statoil. There are submitted opinions stating that one should arrange for retrieval and accessibility to the information one is needy of, and not everything else. Despite of the users' views on accessibility one member of the core project group states that there is a solution to this problem incorporated in the solution:

"What I see as very positive about the new solution is that when you search for information you do not have access to, you actually get the opportunity to ask for permission to access. So that is something I believe has become much better [...] In accordance to this we now have got clearly defined roles in the tools, that meaning who's responsible for accessibility. We had this in prior solution, but the roles were not defined, so it becomes more coincidental". (Respondent 4)

It seems obvious then that the solution provide a solution to the problem concerning accessibility to confidential information, and that the problem possibly is more in distributing what the functionality is able to do so that the end users are aware of the possibilities.

Summary search and retrieval
Table 10 summarises the findings related to search and accessibility of information. It is divided into search and retrieval, and accessibility.

Table 10 - Characteristics search and retrieval

Factor	Finding
Search and retrieval	• Amount of hits influence user confidence and use of search tool • Search engine finds confidential and sensitive content that should have been "private" • Users have problems in understanding the new system of concept; in general related to metadata with underlying notions
Accessibility	• Too many users make information "protected", which in terms lead to a less open information environment

6.2 Process Goals

The results in this section relates to the process goals formulated in the project handbooks. The process goals related to the organisational effects Statoil is eager to achieve by running the project. The process goals will be jointly summarized in a table in the end of the section.

6.2.1 A trained and able organisation using Statoil's best practice for collaboration and content management

As stated in the eCollaboration strategy people and organisation trained and prepared for collaboration is an important aspect of the implementation project. So to obtain increased value and desired capabilities of a collaboration environment and process, the people involved need to bee competent in utilizing tools, services and good practises. In this section we will present the results related to training and best practices.

There are many different views concerning the training provided. A member of the core project group explains how the training initially was meant to be:

"The plan was to implement a plain out-of-the-box type of solution, with a technical implementation followed by 14 days of training and support. Then everything was supposed to be up and going [...] it is rather odd that the ones who set this up also has been involved in several other change projects in Statoil. Seeing it that way they should now that its seldom as simple as doing a 2 week period of training and support". (Respondent 3)

The above statement indicates that the initial approach towards out-of-the-box implementations with little or no training was not well enough thought through. However, the impressions related to training differ among users. This may have something to do with the fact that it has been up to the different business units to adjust the training in accordance to the users' work process if necessary. This is described by a member of the core project group:

"The supply for training has been adequate. Whether they have taken the opportunity is different from business unit to business unit, person to person and team to team. But I think it has been adequate with possibilities adjusted for the program". (Respondent 1)

To get a more in depth view of how this have been working in the business units, one respondent in underpins:

"In KTJ we have only chosen to introduce the basic training. We have not had any other end user training than the e-learning. We have been very clear on this because UPN had a demand that the e-Learning program should be enough. Therefore we decided that we weren't in need of any Rolce Royze on our users when UPN could manage with the basics" (Respondent 11)

This indicates that there is a degree of influence among the different business units. It seems like this may lead to training adjustments based on the wrong criteria, and that the users' need for training does not have any influence related to the adjusted training within the business unit. It must be highlighted that KTJ was responsible for the roll-out of the solution, so this may not be an adequate example to state this, but it gives an indication of that there are intervening factors that may affect the selected approach towards training. The statement also indicates that there has been a basic training program that every business unit is obligated to go through. This is related to the e-Learning modules which are also specified as a demand in the eCollaboration strategy. A member of the core project group illustrates the usefulness of the e-Learning modules:

"We have gotten good feedback on the e-learning modules and it seems like these have worked well for the people who have taken initiative to go through them. However it seems like an excuse for someone that if we haven't come to them, taken their hand and told them

exactly how things work, then they haven't been able to use them either…this is kind of the typical Norwegian attitude" (Respondent 3)

Among the users there seem to be different opinions whether the e-Learning modules are good or not. But one user confirms the above statement by saying:

"[…] one has these pages (e-Learning) where you can go in and see how you do things. If you use these they are very good, but now and then when you sit there working it would be favourable to have someone there who could tell you exactly what to do" (Respondent 12)

The above statements indicate that the favourable solution would be to have someone who could sit down with every employee and tell them exactly what to do. In terms of this it seems like the e-Learning modules (and fact sheets) may be very technologically related. By having someone there to tell them exactly what to do it would help them in relating the tools to a current work situation, something an e-Learning module won't. This issue is something that there seems to be a rather mutual understanding of and which can be related both to the e-Learning modules and to the business units that have had additional training through classroom teaching. A respondent who have had classroom teaching underpins the following:

"There has not been much training; moreover there has been classroom teaching. We had a good teaching course that functioned very well. The problem is that when you sit and get taught you see what they do and you get maybe two hours to test it yourself. Then when you're back at you desk it's like the hard-drive is deleted, and you need to start over. So I believe that superusers should have participated more actively with continuously observation the first 2-3 months" (Respondent 9)

This quote, with others above indicates that it is hard for end users to relate the training they are given to their everyday work processes. This is further explained by another end user:

"I'd like to call the training very rough. We were trained in use of the system, but to use it in the working day you need to get down to another level. There is a need to state how we in our group shall use the system, and that part was not involved" (Respondent 12).

It is evident that in an organisation Statoil's size there are problems in sitting down with every single employee to make them use the solution the right way. However it is described by a respondent that this is the ideal solution, but also a solution that is not possible to go through with. This seems like a problem the users have thought well over, and there are clear indications on that most of the users would prefer, and be in need of continuous follow-up support in a period after the initial training. Like one user states:

"[….] if we were followed up more closely after implementation we would avoid spending 2 hours with something that should take 10 minutes". (Respondent 9)

Despite of this, there are help resources available. We have earlier mentioned fact-sheets and e-Learning modules. In addition Statoil has involved several superusers in every business unit, and has a internal IT support channel available 24 hours to answer questions. One member of the core project group describes the use of help resources in Statoil:

"We reveal that there is too many who do not approach the best practises or the e-learning modules before they turn to support. So, the threshold of calling support in Statoil is very low,

something which has involved a high pressure on IT support in the implementation project". (Respondent 3)

This can be reflected in the answers gathered by the end users. It seems evident that most of the end users prefer face-to-face learning rather than other methods of learning/training. Most end users seem to approach IT experts situated near them or local superusers when they are in need of help. However as one end user describes:

"There is a system of local superusers, but their competence related to help is functioning to a very varying degree". (Respondent 9)

This indicates that when the IT experts and superusers are not available or not capable of helping the phone support is the preferred access point of help. The superusers function is to be available and provide guidance with questions related to the solution. By having superusers trained and available in each business unit they may be able to solve problems related to usage of the solution on a local level of the organisation. One superuser describes the way selection and training was done as follows:

"They picked me to be a so called superuser in the start, and that was really not my thing. But I went through the training, which went very fast. So I felt that it fell out of perspective in terms of me not having the time to sit down and experiment with and use it and to understand what is necessary to understand". (Respondent 7)

The information related to selection of superusers was limited, but as illustrated in the above quotation one may question whether superusers were selected in an appropriate manner or not.

Summary training
Table 11 illustrates the characteristics identified in relation to training and support initiatives.

Table 11 - Characteristics of the training and support initiatives

Characteristics of the training and support initiatives
• Adequate supply of training and support initiatives, however it varies to what degree the business units take advantage of this • Training too technological focused, a need for more process oriented training is emphasized. • A need for closer "follow-up" support in post-implementations phase is emphasized • Good feedback on eLearning modules, although there seems to be lack of usage • Superusers' function to varying degree, not always the appreciated access point for support

6.2.2 A management understanding the importance of managing the collaboration and content management process

Statoil want a management who understands the importance of managing the collaboration and content management. The answers we got in this part will describe the employees' perception of how well the management is familiar with their collaboration and their understanding of the collaboration and content management processes. These answers can of

course be different from the reality, but at least they will give a good indication on how well the management has communicated these issues to the rest of the organisation.

Management understanding
Among the people who have been involved in the implementation project, we got the impression of a management being supportive and understanding of the implementation. It is said that the project has been well grounded in the top management, and that this has been an important issue in the implementation project to get accept in all levels of the organisation.

"That is one of the other advantages we have had compared to other companies. We have exchanged a lot of information. We have done a lot of exchanging experiences with other organisations about the solution [...] organisations that have implemented the same solution, except for what we have done to make more custom components to bind the solutions together and to the archive. What is an exception [...] is that none of the others have had a program as anchored in the top management." (Interview nr 3)

This respondent describes the participation in top management as unique compared to other organisations. The involvement is also underpinned by another member of the core project group who describes how the administration in Statoil was the first group to actually test the new solution:

"What is a little interesting is that the first group to use the new solution was in fact the administration in Statoil. That means that we at least have got interest from the administration, and that will influence the administration to understand the issues about sharing information and collaboration in teamsites." (Interview nr 4)

This quotation supports that there are interest for the collaboration process, and that the management tries to take part in this process. As for the understanding of this given process, we got a lot of indications of the top management being not so understanding as the lower levels of management.

"I don't think they are too caught up in the collaboration process. An understanding for collaboration I think is in the spine at most employees in Statoil. But if you say that you need support for collaboration, I think you would get the answer that there has always been collaboration, and there has been good collaboration." (Interview nr 4)

The end users, meaning the respondents who have not been a part of the implementation project is not so familiar with the participation in top management. They describe a lack of communication from the top level, and are not so sure if the management has a good idea of their collaboration process and how they use the solution.

"The management in my unit use this tool themselves. Those higher up, I don't know. They have told us to use it, and I expect them to use it as well as the rest of us. But all I know is about the management in my unit of the organisation." (Interview nr 12)

This is further underpinned by another user:

"I have to admit that I haven't heard anything in particular about that. Nor if they had any expectations in particular other that that they want us to use the systems that are agreed" (Interview nr 9)

We can see that the end users in the organisation don't know much about the top management's involvement in the project. Even though the people involved in the core project team says that the management has been much involved in the project, and also the first to use the solution, this has not reached the end users. Although they think that the management understands their need and culture for collaboration, they are less sure if the management understands the process their use of this kind of solution.

"I think the best way to show your understanding is to be in front and make a good example. I think that is important, and that is one of the things I miss. […] I think it's unfortunate when a 3 mb attachment is being sent via mail to 250 people from the top level. (Interview nr5)

This quotation also strengthens the impression that the management are in lack of a good understanding of the collaboration process in Statoil. Even though we have described earlier how they were involved in the project and use the solution, it is not fortunate if they don't follow the process the same way as the rest of the users have to do.

Summary process goals

Table 12 illustrates the main characteristics related to managerial understanding and involvement in the collaboration and content management process.

Table 12 - Characteristics of managerial involvement

Characteristics of managerial involvement
• User impression that top management don't know much about the collaboration process and the importance of it, although it is stated by core project members that the program well anchored in top management • Solution affects everyone in that everyone must use it, however uncertain whether top management really meet this in the same manner as end users must • Business unit management uses solution at same level as "normal" end users.

7. Discussion

This chapter of the report will discuss our results from the analysis phase in the prior sections. Our research includes two particular areas of IS research. This is the research of eCollaboration and the IS evaluation research.

Seen from a benefits management view Statoil has identified eight strategic objectives further reformulated into five potential effect goals they could obtain from collaboration@statoil. This was done based on a feasibility study that was done to identify whether the goals could be accomplished or not. As described in the section on Benefits Management (c.f. 3.2) the purpose of the BM process is to improve the identification of achievable benefits, and to ensure that decisions and actions done during the implementation lead to the realisation of all these feasible benefits (Ward and Daniel, 2006). According to the Statoil case, developing the eCollaboration strategy was in relation to a BM approach initiated to establish the investments objectives and the business performance improvements that the technology and associated changes could deliver (Ward and Daniel, 2006). When then potential benefits are identified it would be easier to be precise in the post-implementation review whether they are achieved or not.

In this section we will discuss the results presented in light of prior research. According to what Ward and Daniel (2006) emphasises (c.f. 3.2) our discussion is formed with intention of determining and confirming which planned benefits that have been achieved. By discussing in light of prior research we will draw discussions round factors that may have influenced the realisation of potential achievable benefits. Doing this, we want to provide a foundation for the phase were we recommend whether remedial actions can be taken to obtain future benefits.

7.1 Compatibility with the Enterprise – wide ideals

Reflected in the table presented by Ginsburg and Duliba (1996) there are certain elements an enterprise-wide collaboration solutions should include. In terms of this we have compared our findings in accordance to the principles stated as enterprise-wide ideals (table 13). The solution meets most of the enterprise-wide ideals; however there are intervening factors, so some of the ideals would be discussed to a more extensive extent later in the discussion.

Table 13 - Compatibility with enterprise-wide ideals

Enterprise-wide ideal	The Statoil case
Efficient protocols	Solution based on intranet technology that ensures effective sharing of data, both internally and externally
Portable, high performance implementation	Based on intranet technology the solution has few or no obstacles related to various operative systems.
Effective client interface (GUI) design	Standardised user interface and structure.
Scalability	Base on intranet technology the solution provide access from unlimited amount of users, without affecting performance negatively.
Distributed management	Uncertain, research does not cover this area
Interoperability with legacy systems	Access to data through one “single pool of information”

Distributed security	Uncertain, not emphasized to enough extent in this research

7.2 Implementation project factors

Implementation project factors are related to the organisation and conduct of the implementation project. We have mainly focused on two implementation project factors. These are best practices and training initiatives involved in the project. This section will discuss our findings related to this.

7.2.1 Best practices formed to support the collaboration process

Statoil has implemented a set of best practices for usage of the different tools in the new solution. Described in addition to the principle of conversion contingencies (c.f. 3.1) the development of best practices may be seen as a managerial attempt to influence the potential value that may be derived from the investment in IT. By investing in initiatives like this, the organisation is trying to lead focus to the human asset (c.f. 3.1) of the technology implementation in an attempt to maximize benefits. This section discusses the best practices implemented, and its effect at prior state.

Our results indicate that in an organisation of Statoil's size there is a definite need for best practices to assure that the available tools are used in a proper manner. It is evident through prior research done on best practices in Statoil (c.f. 2.8.2) that the organisation have prior experiences concerning best practices and is very much aware of the importance of best practices in relation to collaboration technology. Despite of the fact that Statoil has invested many resources in developing best practices these suffer from being too much focused on the technological possibilities the tools provide. Similarly, this is kind of odd because prior research on best practices in Statoil (Kvestad and Olsen, 2005) found that there has been an increased focus on process when developing best practices for the solution. Increased focus then by relating best practices to the different collaboration processes to give definite recommendations to what collaboration tools that can be used in each collaboration process (Kvestad and Olsen, 2005).

In contrast, our results indicate that best practices to a large extent illustrate several different possibilities of doing the same thing; in general different ways of approaching the collaboration tools, something which in terms makes the best practices very comprehensive. Comprehensiveness may then become a central barrier of usage. This issue may be reflected in the issue that in an organisation Statoil's size it is almost impossible to involve a representative selection of users in the development of best practices. An effect of this may then be that many users do not feel the best practices are well suited to their work processes.

As highlighted by our results (6.1.1) the change to a new structure (web-based) has had a definite impact on the users work processes. By going from a Lotus Notes based solution to using metadata the users has been involved in a major process of change that has been accepted differently. Our results indicate here that the metadata to a large degree reflect the process. Additionally, there is no certainty that the Best Practices are not developed well enough, because the users' problems in understanding and using the functionality underlying the solution may intervene. In general we here point to metadata definitions like activity and categories (c.f. 2.9.2) that are related to the collaborative functionality of the solution. Seen in light of our results, users need to be able to know how to use the solution to use best practices.

Problems like comprehensiveness and too much focus on technology seem to be barriers that effect usage of best practices. Like stated in prior research on best practices in Statoil (c.f. 2.8.2), in an organisation Statoil's size barriers to use are merely impossible to avoid (Kvestad and Olsen, 2005). There will always be people wanting to do things their own way and there will always be subcultures. This makes it very difficult to adjust best practices to fit into every users work process. However, as brought up in literature and in our results there is a need to pass on best practices again and again to make the end users understand and use them in a proper manner. This view is supported by the three underlying elements (c.f. 2.8.2) that best practices must meet. In the phase Statoil is now; in general that means that they still is questioning aspects of the implemented solution and try to find areas of improvement, it seems like the issues concerning best practices somewhat logically represent the phase they are in. This makes it important to continuously challenge the best practices implemented and intervene by adjusting them whenever limitations are discovered.

In light of prior research done on collaboration technology implementations (c.f. 2.8.2) our study highlights many of the same issues. The importance of clear guidelines and routines to increase the effect of the technology (Munkvold, 2003) is one of them. In relation to theory, the comprehensiveness of best practices at this state of time somewhat seems logic to the post-implementation phase Statoil is in (c.f. 2.8.2) because the development of best practices requires a period of learning and experimenting with the technology (Munkvold, 2003). As highlighted in the chapter on central challenges and barriers (c.f. 2.9.1) exceptions to the formal routines occur frequently in the day-to-day work practices. Some flexibility should be built into the systems, to accommodate for these exceptions (Munkvold, 2003).

In regards to flexibility, when implementing an enterprise-wide solution we discovered that it may not be substantial to implement an equal set of best practices in every business unit. A common set of best practices for all units may be sufficient, but taking time to help they should be adjusted accordingly to fit each separate business unit. This because different units have different needs, work processes, competence and knowledge. Theoretically viewed (c.f.2.8.1) best practices should be based on careful analysis of the work setting and how the features of the technology can be matched to this (Munkvold, 2003).

In light of the above factors our study highlights the following issues concerning best practices.

- Best practices are seldom best practices in the early post-implementations phases, but a common instrument is necessary to set the future course.
- Organisational experience and learning is necessary to develop a sufficient instrument of Best Practices.
- Experience and learning must be used to adjust best practices according to business unit needs, changes in work processes and newly discovered opportunities.

7.2.2 Training and support to relief the change process

Models for assessing value from IS investments (c.f. 3.1) argues that to obtain potential value from IS investments organisations need to invest in services to assure that the organisations has a competent human resource. This involves investing in training and support for the human resources in the organisation. Shortly summarised Statoil has invested in the development of mandatory e-Learning modules, in addition to initiatives specific to the

different business units. To assure a competent human resource Statoil has taken ability and competence into consideration in both the corporate eCollaboration strategy and the project handbooks (c.f. 5.2)**.** This section discusses the training and support initiatives related to the implemented solution.

Results provided by core project members indicate that the supply of general training and support opportunities given to the different organisational units is adequate. On the other hand each business unit individually is responsible for the selection of the appropriate training for their users. This way of doing it seems logical, because Statoil is a very big organisation, which in terms leads to that there are several business units were the solution are to be implemented (c.f. 5.1). By doing it like this the training and support may be adjusted to fit the different business units' needs, competence and experience. As illustrated in 2.2.6 large organisations with several business units may differ significantly in practices towards collaboration (Karsten, 1999). Further as illustrated in our section on user training (c.f. training) the training ownership should be completely in the hand of the business units, or controlled by them (Simonsen and Sein, 2004). It is therefore possible to make an indication that issue of responsibility and ownership of training has been handled properly in Statoil. Despite of this there seem to be some cultural related behaviour which does not fit into this way of thinking. In Statoil, some units seem to affect the behaviour of other business units, this in means of how the training has been submitted to the users. This way some business units seem to select training for their users based on the wrong criteria. The effect of the above statement has been that business units have provided their users with the absolute minimum of training; in general this means mandatory e-Learning modules and fact-sheets.

Our results indicate that the feedback on the eLearning modules, when actually used, has been positive. However, as discussed above Statoil is a very big organisation, and it is difficult to adjust and make modules that fit into each of the different business units, since the practices towards collaboration may differ significantly. With this in mind, our results suggest that the eLearning modules are too technologically focused and that there is a need for additional support to make profit of the solution in relation to the actual work processes. The issue of technological focus in contradiction to process focus is something that is highlighted in our section on user training (c.f.2.8.1) which says that to have a business focus a best practice in training require the use of specific business process examples during training to address motivation. The goal of training is not simply to get the employees to learn a new system but learn how to do their tasks using the system (Simonsen and Sein, 2004). Similarly our results show that in the business units that conducted classroom training they were trained in the solution, but there was a lack of training exercises, something which in effect lead to users having problem using the solution properly when they were back at their desks.

Initially, the solution was sold in with the argument that it was an "out-of-the-box" solution that required little or no training at all. As Karsten (1996) argues in her study on enterprise-wide implementations of Notes there is actually a need for increased focus on support and training with collaboration technologies in contrast with traditional information systems. The major reason for this is that collaboration systems involve group interaction that may affect work practices in major ways. So when this was the initial plan it seems logic to believe that there was not laid too many resources and time in developing a comprehensive training strategy, which in the section on training is specified as a requirement.

In accordance to additional support resources Statoil provide their employees with a 24 hour IT support. In section 2.5 we explained that collaborative culture would not appear necessary

for acceptance of collaboration technologies (Karsten, 2006). However, from our results it seems that organisational habits and patterns may have impact on use of training resources. In Statoil there seems to be a very low threshold concerning call of IT support, something which in effect means that users call support before they use best practices or e-Learning modules. This was not the initial objective, because e-Learning modules and best practices were developed to be the preferred guidelines for process related issues. IT support is primarily more technology related. It is difficult to make a statement on the reasons for this trend, but one possible explanation may be that people prefer human interaction in contradiction to individually make an effort to solve problems. So if the superusers not are able to provide the help necessary, calling IT support may seem to users like the next best thing. In addition it seems like face-to-face training/support is the preferred alternative if the users were to choose. This is no unknown phenomena, and like stated in the section on the eCollaboration paradox people seem to consistently perceive face-to-face communication to pose fewer obstacles to effective communication than other, particularly electronic, media (Kock, 2005). It is no reason to believe that these phenomena should be any different concerning training and support.

In light on prior research done on collaboration technologies and training our results support what is previously stated. Despite of its importance (c.f. 2.8.1), organisations tend to give too little emphasize to training (Munkvold, 2003). Training is often inadequate, only focusing on the "mechanical" functions of the technology and not how to relate the functionality of the technology to the work task needed to support collaboration. This impression is strengthened by our study. Prior research (c.f. 2.8.1; 3.1) suggests that because of its nature, there should be an increased focus on training in collaboration technology implementations (Karsten, 1996), and training need to be followed up by incentives to adopt the new work practices and some form of audit to ensure that these practices are continued (Munkvold, 2003). The complex nature, combined with the scope of the solution implemented in Statoil emphasizes a need for the suggestions pointed out in literature (c.f. 2.8.1).

In addition, in enterprise-wide implementations like the one explored in our study, business units influencing each other call for a more mandatory approach towards training, something that prior research highlight (c.f. 2.8.1) as missing despite of its documented importance.

7.3 Technology Factors

The technology factors can be divided into factors that are more or less general for collaboration technologies and factors specifically related to different tools or services in the solution. We have identified several factors influencing the implementation of the collaboration solution. This section will discuss these findings.

7.3.1 Perceived ease of use

The solution implemented in Statoil has a wide range of users of different types, here everything from professional IT personnel to users that do not have much experiences concerning technology. To meet this Statoil has included a definite strategic goal concerning ease of use in the eCollaboration strategy. Despite the fact that there are a many different types of users in Statoil, our results indicate that users have a mutual perception of what perceived ease of use is. That the solution is easy to use, easy to learn, self-explaining and have a common user interface are issues that are highlighted.

As illustrated in the extension of the TAM model (c.f. 2.6) perceived ease of use has direct impact on use of information systems. This confirms that the users' perception of perceived ease of use is not different from prior research. The solution meets the requirements of perceived ease of use to varying degree. The solution provides the users with a common interface were functionality is Windows based and everything more or less looks a like. This is something users highlight as a positive aspect of the solution. This is very important and as illustrated in the section on challenges and barriers (c.f.2.3) the more intuitive the client interface design is, the easier it will be for users of all computer skill levels to make use of new applications as they are developed and rolled out (Ginsburg and Duliba, 2003). As illustrated in the section on central challenges and barriers (c.f. 2.9.1) a central problem concerning collaborative technologies are that they often are too complex to use (Midwinter and Sheppard, 2000). Statoil is as mentioned earlier not unfamiliar with the implementation of collaboration technologies so the issue of complexity should be something that they are aware of. On the other hand the new solution presents a new challenge to users in that the new solution is entirely web-based. This indicates that ease of use is closely related to the users' prior experiences, not with collaboration tools and functionality as a term, but in relation to a new structure. So despite the organisations prior experiences with collaboration technologies, a new web-based structure brings a new aspect of complexity into consideration. The effect of this seems to be that users with a high degree of prior experiences with Internet usage will perceive the solution more intuitive and easier to use than users with a lower degree of prior experiences. This issue seems to have an effect on the solutions threshold of learning and this threshold seems to be higher for the elder generation employees than for the younger.

A high threshold of learning, new structure and complex collaboration tools indicate that the more individual based tools are more easily adopted. Our research supports this. In example, users' will in most cases sit and write the actual information by themselves, and not in groups. So in terms of this it is of great importance that the collaborative tools do not overrun the more individually based tools. On the other hand, the collaborative tools must be easy accessible. This is mentioned according to Grudins' (1994) principle of unobtrusiveness and accessibility (c.f. 2.9.1). In terms of a user friendly user interface, this is very much an important aspect of perceived ease of use. In Statoil, this issue is met through the individually based entrance portal Outlook today that is integrated with the personal "mySite" and teamsites. In this sense, the solution highlight individually based tools, and emphasizes accessibility to collaboration tools through one single entrance portal.

Despite that it seems like a web-based structure is something that has created a higher threshold of learning for some users, as seen from the experienced users' perspective the web-based user interface is pointed out as an obvious strength. One can use links to anything anywhere. Pointed out as one of the enterprise-wide ideals (c.f. 2.3) the network protocols chosen should not take up unnecessary bandwidth, and be able to share data effectively to users throughout the firm (Ginsburg and Daluba, 1996). By using links to anything, anywhere the Statoil place a foundation for more effective information sharing throughout the organisation, and indeed by using the World Wide Web as platform unnecessary bandwidth won't be an issue.

7.3.2 Perceived usefulness

Perceived usefulness of collaboration systems is to some degree more difficult to measure than for other information systems. As presented in the eight challenges facing groupware implementations (c.f. 2.9.1) groupware applications often require additional work from

individuals who do not perceive a direct benefit from the use of the application (Grudin, 1994). In terms of this the impact the solution implemented in Statoil will have on the individuals perceived usefulness of the solution will differ. This is supported by our results. In relation to our results, users in roles that have been directly influenced by the implementation and users directly involved in the implementation project, either as superusers or core project members more easily sees the benefits the solution may contribute with, something that in addition will increase their perception of perceived usefulness. Table 14 illustrates different aspects of disparity in work and benefit in accordance to Grudin (1994).

Table 14 - Disparity in work and benefits

Disparity in work and benefit
All users must archive their information if organisation shall obtain full potential of benefits from the common "pool of information", even if archiving not will provide direct benefits to the individual user.
Users must invest individual resources in going through available learning/training materials. Even if they feel they manage usage of the solution success depends on that every user use the solution in an equal matter.
Users must invest individual resources in understanding and using central principles related to the solution; in general metadata definitions and usage of links (web-interface), even if there are not in direct need of it in accordance to their working day.
Collaborative functionality like Teamsites, document workspaces and others makes it crucial that every users involved in a group shares their information, even if it seems more easy to store using more individually focused functionality; in general mail and local hard drives.
Some users must invest time and resources in developing a good foundation in use and competence of the solution so that they can be a resource for others, even thou they may not obtain more benefits from the solution than any other users; in general this is superuser's.

In example the effect the solution has had on the role of the record and information manager supports this (c.f. 6.1.1). If users feel the solution supports their work in a more meaningful sense than before, it will have significant influence on perceived usefulness and will affect adoption of the technology in a positive sense. The technology acceptance model (c.f. 2.6) supports this finding by stating that perceived usefulness will have an effect on usage of information technology. On the other hand the TAM model adapted to measure user acceptance with collaboration technologies states that perceived usefulness alone does not influence usage. The extension of TAM argues that perceived usefulness of the system combined with prior experience has a significant impact on usage (Dasgupta et al. 2002). Similarly, many end users see the possible benefits of the new technology, but on the other hand they feel they had the same opportunities in the prior solution. An effect of this is that users do their best to make the solution work at the same level as the prior solution, and fail to see the new and improved functionality provided by the new solution. From this perspective the new solutions will, to many inexperienced users just become a new system to learn, and if seen in contrast with the prior solution, not be an improved resource in their everyday work.

7.3.3 Increased focus on collaboration

Going over to a new structure, combined with new tools has involved major changes to the employees' work processes in Statoil. Our results indicate that one major effect of the implementation process is an increased focus on collaboration in the organisation. This can be seen as a logic outcome of the initial eCollaboration strategy which state that the solution is implemented to improve efficiency and collaboration among internal and external participants (c.f. 5.2.1). Indeed the solution itself has increased the focus on certain roles in the organisation, but as stated by key participants in the implementation process one can not explicitly rely on the new solution itself to obtain the benefits. As there has been a major

change process affecting the users' everyday there need to be something which assures that the focus on collaboration stays intact, because getting rid of old habits and work patterns is a difficult task in itself. As suggested by Munkvold (2003) an increased focus on routines may increase the effect of the technology. In the chapter on central challenges and barriers (c.f. 2.9.1) there is illustrated that users easily can fall into temptation of comparing functionality of the new solution with prior solutions and that this issue was present when the organisation was going through a change process from MEMO mail system to Lotus mail system. A similar type of situation has occurred in the current change process as Statoil has set a limitation upon the mail capacity in MS Outlook, and in light of the this initiative there has risen a need among the users for a more integrated mail management process that integrates the mailbox to the Teamsites. This initiative has been accepted to very varying degree by the end-users, and by far the mail management process has not been implemented. On the other hand a mailbox limitation has led to a strengthened focus on collaboration in the organisation, and that it is of great importance to whether Statoil will have the opportunities to obtain the possible benefits of the solution. However, it seems like the lack of integration between the mailbox and Teamsites is something that to this date reduces the possible benefits related to collaboration in Statoil.

7.3.4 Equal usage

Usage of information systems is as expressed in the section on perceived usefulness a premise for the success of any information system. However, concerning collaboration technology individual usage alone is not enough to assure success. Our results indicate that an extensive collaborative solution like the one implemented in Statoil need to be used a like to exploit the potential possibilities. As stated in challenges and barriers (c.f. 2.9.1) collaboration technologies differ from single user tools in that it is interdependent among the users in that the benefits and costs of the applications to one user are contingent on the behaviour of other users (Munkvold, 2003). Although the solution may have a substantial effect on some individuals, either that be in terms of distribution of information, structuring of tasks and teams or having information more easily accessible the solution will not function in an optimal matter without everyone using it a like. In general we here relate to shared space technology like Teamsites and the common archive. In example one employee that refuses to go away from storing his/hers information locally or on their mail account may, depending on the importance of the information, affect other individuals work processes significantly. The issue of equal usage of collaboration tools in Statoil is not something new to the organisation. The study of a Lotus Notes implementation in Statoil (c.f. 2.9.1) emphasizes this issue by stating that the document management and workflow tools that required each user to produce input to a shared database was a major challenge which inhibited Notes from being exploited to its full extent (Munkvold, 2003). From this perspective it seams like Statoil is now facing several of the same challenges they faced when implementing the enterprise-wide Lotus Notes solution. What is interesting is that Statoil was aware of the possible challenges then, as they were now. In terms of this one can question why the organisation still has not been able to meet these challenges. Is it because the new solution is even larger in scope and functionality, does it have something to do with difficulties of evaluation or is it just too early to in the process to make the employees use the solution in an equal matter. Another interesting issue is to what degree it is actually possible to ensure, in a large organisation like Statoil that users use the tools provided by the solution in an equal manner. These are issues that at present date is hard to make a distinct answer too.

In accordance to prior research on implementations of collaboration technologies our results supports the prior findings. In the context of perceived ease of use and perceived usefulness (c.f.2.9.1) it seems like the more basic tools like mail and calendar are appreciated as easy to use and is, despite of some barriers related to the new solution, easily adopted. These tools have rather basic functionality, are less complex and most people have prior experiences with usage, something that make adoption more likely to occur. Like stated by Munkvold (2003) tools that require more extensive user contribution (shared databases, document archives) may take longer to adopt. This is also the issue concerning Collaboration@Statoil, something which can be based on the problems users have in using and establishing a good competence in more collaborative related tools, in general Teamsites with its underlying functionality.

Perceived usefulness is, like in most other implementation projects an effective driver for adoption. Like stated above, tools like mail and calendars are easily adopted because they are rather intuitive and easy to use. On the other hand the benefits by easily being able to distribute one-to-many information are obvious, and more importantly is directly related to the individual. Like stated in the section on classification of collaboration technologies (c.f.2.1) issues like this has made e-mail referred to as the most successful collaboration technology regarding diffusion and user adoption (Munkvold, 2003), something our research supports. However, the basic functionality makes the possible benefits derivable from these tools limited, and in contradiction to prior solutions it does not provide something new. As illustrated by prior research (c.f. 2.9.1) factors like complexity and the disparity in work and benefit with the more “heavy” tools influences users perceived usefulness in different ways. Collaborative tools does never provide the precisely same benefits to every group member, so benefits often depend on preferences, roles and assignments; something which imply that benefits related to these are more likely to occur at a later state of time (Grudin, 1994).

Illustrated in our introduction (c.f. 1) potential benefits from IS investments are often not likely to occur before a while after implementation (Remenyi, 1997). Our research supports the finding in that it seems like the potential benefits related to collaboration and content management tools are yet not fully realised. This may reflect prior research which states that users actually is able to adapt changing work processes and use of collaboration technology, but that this is a gradual learning process that may take long (Munkvold, 2003). This reflects that organisations need for time to build experience with the different technologies. Similarly, prior experience was highlighted as a very essential factor in our study.

7.4 Technology specific factors

The technology specific factors are related to different tools and functionality of the solution. We have mainly focused on the content management tool and search engine. This section will discuss our findings related to content management, search and retrieval.

7.4.1 Auditable content management

The goal for the solution is to support all the stages in the content lifecycle. We compared the results from our analysis to the literature on content management to see if this part of the solution covers the recommended steps in the content lifecycle.

The solution contains templates for the users to base their content creation on. When they create a document in a document workspace, they have all relevant templates available, and frame their content based on this. If the users cooperate with other users on a document, all of

them have access to the document by using the teamsite in the solution. All the involved users can then view the document and make their comments and changes. So this can be a kind of approval phase, and may contribute to rise the quality on the content

When the creation of the content is done, it is time for publishing or in this case filing the content. McNay (2002) describes that this process should be as simple and fast as possible. As described above, Statoil have emphasised this issue, and they have tried to make the archiving process as easy as possible. The informants described that it takes two clicks for a user to send a document from a document workspace to the archive. They had prior experiences in Statoil that told them that users didn't archive their content when this process took much time and effort. So the focus on this process helps the users to file their documents. When the users get better to file the content, it is also easier for other users to find and reuse this information, so simplifying this process can have a great positive effect on the organisation if the users can pull it through.

To manage information in a proper manner involves attaching the right metadata to the content (c.f.2.9.2). The metadata is also one issue that has got a lot of focus in the implementation project in Statoil. It has been a big change to move away from the hierarchal structure and documents databases, to a flat structure where the metadata is the system of concept. As described in the paragraph over, there has been great emphasise on making the filing process easier for the users. This means that the metadata is set automatically, based on where the content is created. But although the users don't have to mind the metadata, there are still some who want to change them, because they don't agree with the data set by the system. The use of metadata is also meant to be effectively used when searching for content in the solution.

In relation to previous research we have looked at on the area of ECM (c.f. 2.9.2), we found that our results can be related to the previous results. McNay (2002) argues that benefits to both the end user and the enterprise can be found in organisations that have implemented ECM systems. The benefits we have found is mainly to the end users, as it would probably be to early at this point to identify the organisational impact.

Smith and McKeen (2003) have found that one important benefit of ECM is that the access to information gets better. Publishing the content in an ECM system makes it easier for all the users to find and reuse the content. What we have found in Statoil supports these findings. The informants agree that the solution, if used properly, will with shared information spaces and one single archive make it much easier to get an overview and to find the content they need. In addition accessibility to competence through other members of workgroups has been described as easier in the new solution.

Both Smith and McKeen (2003) and McNay (2002) have found that content value increases if it is used by more than one user. The content available is up to date and more accurate than it otherwise would have been. Our results can be related to these findings. We found that the users perceived the content as more updated and found it easier to find the latest versions of a document.

As mentioned above, it is too early to see organisational impact the CM solution may provide, but it is reasonable to believe that the benefits mentioned above will have an effect on the enterprise through time. Smith and McKeen (2003) and McNay (2002) argue that implementation of an ECM system will lead to increased productivity and time saving for the

enterprise. Although we can not identify these benefits in Statoil at current time, we found that several of the users already see the potential in the solution, and so it is likely that this benefit will occur at a later time. This is supposed the users adopt the solution and use it the intended way.

7.4.2 Search, retrieval and accessibility to information

Collaboration@statoil includes a new possibility which has not been included in prior solutions. In general this relate to the possibility to search across the organisation with the search engine FAST. As the eCollaboration strategy and project handbooks state this is initiated to provide a more open environment were information can be more easily retrieved.

Our results indicate that to some users the search engine is the most important element in the new solution in the way that they can find everything they need to support their day to day work processes. It is described as a cornerstone in the new solution and a tool that may have great influence on information retrieval in the organisation. However, there are several limitations brought up by our results. Despite the fact that most users see the potential given by the new tool they highlight an important barrier. When using the search engine it tends to give too many results, which in terms create a problem for users finding the information they are looking for. A possible explanation for this may be drawn by separating users of the intranet searching engine. As stated in the section on information retrieval (c.f. 2.9.3) it seem to be significant differences in how trained information retrieval specialists search for information to how normal web users search for information. It is too harsh to draw conclusions around this matter but it is likely to believe that professional information retrievers, which have definite focus on information retrieval in their everyday work, are more experienced in using advanced searching technology such as the one implemented in Statoil. Another aspect which highlights this is illustrated by our discussion (c.f. 7.3.1) in that many end users tend to have problems in recognizing themselves in the metadata definitions. Since metadata is an important underlying element in the new solution, logically employees with information retrieval as an important part of their work process, here in particular record and information managers are in need of a wider understanding of this. On the other hand normal users with less experience with metadata will form their own impression based on their individual and subjective behaviour. The effect in terms may be an archive with a lot more information than necessary.

The concept of individual users' subjective behaviour is brought further by Stenmark (2005) by making a distinction between users searching the web in contradiction to users searching the corporate intranet. The patterns concerning the two groups are rather similar, but they seem to differ in the sense that corporate intranet users tend to examine only the first result page when having used the search engine. This may indicate that users of corporate intranet search tools are pretty specific in what kind of information they are searching for. It may be possible to draw lines to our case done in Statoil in addition to this matter. As earlier stated, there seem to be a clear indication that the amount of results provided by the search engine is so big that users cannot find the specific information they are looking for. This indication draws upon the untested hypotheses brought up by Stenmark (2005) in that intranet searchers tend to give up quicker, assuming that the information they are looking for does not exist on the corporate intranet. This hypothesis is drawn with basis in that the discovered length of interaction when using the search engine had an average length of approximately 4 minutes. As we do not have definite numbers to relate to concerning end users session length with the search engine in Statoil, it would be too vague to make any assumptions concerning this issue.

However, by having an approximate session time illustrating usage time with the corporate search engine we could have made indications to whether the problems stated above were technology specific to or if other underlying factors intervened.

A more open environment providing better accessibility to information and resources was one of the main targets by initiating the eCollaboration strategy. Information accessibility is related to the above discussion on the corporate search engine, so the problems and effects discussed are also present here. In addition the organisation on one hand has obtained a more open environment in that the search engine finds a whole lot of information and everything is stored in the same "pool of information". On the other hand, by having this "open pool" there has become a problem concerning confidentiality. This issue has led to users protecting their information to a larger degree than before, something which affects the openness which initially was the goal. This aspect is illustrated as one of the eight central challenges (c.f. 2. 9.1) by saying that collaboration technologies may lead to activity that violates social taboos, threatens existing political structures or otherwise demotivate users crucial to its success (Grudin, 1994). Similarly, by making for example teamsites protected and not approachable, users may unintentionally sabotage the possibilities of the solution by actually making it less open than what was the initial intention. However, the solution actually provides possibilities to solve this problem, then by implemented mechanisms for access to protected information. In contrast, this functionality seems to be hardly known in the organisation. From this perspective, the challenge becomes to distribute knowledge and making people aware of that they have nothing to fear, and that important protected content actually may be accessed with the right permission.

From a research point of view there has been little research on search and retrieval of information on corporate intranets (c.f. 2.9.3). Most of the available research focuses on public search engines, and not corporate search tools. However, our research seems to support prior research (c.f. 2.9.3) in that roles in terms of profession may have a substantial impact on how usage is conducted. This implies that efficiency in relation to Intranet searching may be related to the users understanding of search related notions. As prior research states (c.f. 2.9.3) these users were not retrieving information, but seeking information (Stenmark, 2005). This way, there is drawn a distinction to that users searching the intranet know exactly what they are looking for and search to retrieve, and users searching the Internet are seeking something, but they do not exactly what.

Our results support the prior research on collaboration technologies (c.f. 2.9.1) which state that collaboration technologies may disturb social processes (Grudin, 1994). However, by implementing a single "pool of information" all content becomes more easily accessible for all users in the organisation. Our research suggests that this type of solution makes information increasingly more accessible and the environment more open than with database based solutions like Lotus Notes. Concerning this, organisations should involve an increased focus towards the challenge of disruption of social processes if single archiving functionality is implemented, so that resistance is broken down.

At last, prior research suggests that immature technology can create problems with the users trust in the solution (c.f. 2.9.1). As stated by Stenmark (2005) virtually nothing is known about intranet searching. Concerning this issue it is possible to draw an indication round whether the technology is mature enough or not, something that seems rather odd in terms that intranet search technology is based on the exact same technology as public search

engines. In addition to the context of intranet searching, our research too a very large degree questions users experiences towards searching.

7.5 Summary

In this section we have first used the results and discussion to summarize and provide a definite statement to what benefits that has been realised and what challenges that have hindered realisation. In the next chapter we have used these lessons learned and provided recommendations for how the organisation can initiate remedial actions for future benefits realisation.

7.5.1 Benefits Realisation

Seen from a benefits management point of view, determining and confirming planned benefits is a very central part of evaluating the results. Here we summarize the determined planned benefits, or effect goals, stated in the project handbooks, to determine to what degree they have been achieved and what factors that may have intervened. The factors influencing realisations is as stated in the section on benefits management (c.f.3.2) included to understand the reasons why certain types of benefits were or were not achieved and provide lessons for future projects (Ward and Daniel, 2006).

Table 15 - Benefits realisation (Statoil case)

Effect goals	Realisation of effect goals	Issues challenging or hindering realisation of goals
Simplify the collaboration and content management process through integrated and simplified tools, methods and services	• Increased focus on collaboration through intensifications of routines • Common user-interface where everything more or less look a like. • Windows based functionality for production • Outlook today integrating different aspects of the solution • Individual tools for coordination common and user friendly; in general e-Mail and calendar • High threshold of learning for collaboration tools; in general Teamsites.	• New structure (web-interface, use of links rather than attachments etc.) • Intensifications of routines to ensure collaboration • Experiences with prior solutions • Experiences with collaboration@statoil • Lack of mail management process • Disparity in work and benefit
Implement Statoil best practices for collaboration and enterprise content management	• Implemented best practices, but their perceived usefulness differ.	• Technologically focused • Comprehensiveness • Users' competence and knowledge about underlying c@s functionality. • Incorporated work habits and patterns
Ensure auditable (and quality) content management throughout the content's entire lifecycle and	• Relevant templates for production, integrated "comment" functionality and	• Users' subjective behaviour towards retrieval; in general, afraid it gets lost in archive.

the entire collaboration process	easy archiving to support the entire content life cycle.	• Incorporated work patterns from prior solutions. • Draft – Final
Improve search and retrieval process from defined information sources to ensure sharing an reuse of information	• Improved accessibility to information through cross-searching functionality • A more open environment through single "pool of information"	• Experiences and work-related focus (RIM vs End User) • Metadata definitions • Disruption of social processes; in general protection of information
Process goals	**Realisation of process goals**	**Factors influencing realisation**
A trained and able organisation using Statoils best practices for collaboration and ECM	• Business units responsible for adjustments necessary to make training fit with BU needs • Mandatory eLearning modules, but other initiatives are available if needed.	• Internal influence among business units • Technologically focused eLearning modules • Initial impression of "out-of-the-box" solution • Organisational culture; in general low threshold concerning IT support.
A management understanding the importance of managing the collaboration and ECM processes.	• Program well anchored in top management • Interest for the collaboration process, but lack of definite involvement	• Distribution of information; in general end users are only aware of involvement from BU management.

As table 15 illustrate, the obtained benefits are more related to definite tools and functionality in the solution than the entire collaboration and content management process. The organisation at this state has obtained an increased focus on collaboration and the more individually based tools and functionality are the ones that are most appreciated; in general mail and calendar. From a time-perspective this seems somewhat logic in terms of the post-implementation phase the organisation is in. This is because the more individual based tools are the ones that are most likely to inflict direct benefit to the users' work processes in early phases. Further, tools like mail and calendar are known to people, something that makes the functionality more simple and intuitive. Collaborative tools on the other hand never provide precisely the same benefits to every group member, so benefits often depend on preferences, roles and assignments; something which implies that benefits related to these are more likely to occur at a later state of time. These findings are similar to prior research done on enterprise-wide collaboration technologies (Grudin, 1994; Munkvold, 2003).

In our case, it seems like the individually based tools are adopted easier than collaboration tools. According to this the individually based tools must not be overrun by the collaboration tools. Our research supports this principle in that the solution is designed in a manner that integrates the different tools and functionality in the solution through one common entrance portal. This way the Statoil case meets what is mentioned as important by Grudin (1994), that the solution should be designed to be unobtrusive yet accessible. Although increased focus on accessible collaboration and content management tools, the organisation is facing a main challenge in adoption of the tools that require group interaction to be a success.

Best practices for collaboration and content management have been implemented in Statoil. However, the effects of these practices seem yet to be limited because they are developed in a too comprehensive matter, which in terms may affect usage. If it takes long time, or does not enlist the actual work process the user(s) are involved in they may try to meet their problem by taking "shortcuts", or in other words just make the solution work, something which may be

very different from the best practices available. From a collaborative viewpoint, issues like this urge for a comprehensive understanding of the actual work processes because it is difficult to predict and predefine standard procedures for a collaboration solution. However, to the more experienced users the best practices seems to be adequate.

The solution supports the entire content life cycle. Relevant templates for production, an easy archiving process and integrated "comment" functionality are implemented in a proper manner to ensure content with good quality. Yet the organisation does not obtain the potential benefits of content management because users' subjective behaviour and incorporated work patterns with use of prior solutions to a large extent obstruct the full potential. Subjective behaviour in terms of users' "feeling" that once they have filed the content it will get lost in the "new world", something that in terms affect to what degree users actually archive their information. As the table 15 illustrates a single archive combined with a possibility to search across the organisation has; we would like to say theoretically, provided the organisation with a more open environment and improved accessibility to information. However, as the search tool at current state is not able to filter out unnecessary information, or even more importantly confidential and sensitive content the search and retrieval tools are not fully utilized. As table 15 indicates experience and work related focus becomes an intervening variable. Users in roles that is directly affected by the new search engine is more likely to use it beneficiary in their day to day work. Experience is this way not only reflected in the use of the search tool, but also in the understanding of the new system of concept. Metadata definitions and notions is something users have problems relating too, which in terms seems to affect the use of the corporate search engine. As stated by Grudin (1994) it is very important that the collaboration tool does not disrupt social processes, and our results suggest that a more open "pool of information" for retrieval may call for increased focus towards the challenge of disruptions of social processes. At current state accessibility to sensitive information seems to make users, intentionally or unintentionally "sabotage" the solution by protecting their information. Seen from a collaborative view, it is therefore very important to overcome this issue, because in a "collaborative world" like the one visioned in Statoil every user may be crucial to the solution' s success. A further challenge is that because of lack of mechanisms controlling the archiving process the archive is "flooded" with draft documents.

In accordance to an initial impression of an "out-of-the-box" implementation the training initiatives implemented are mostly based on mandatory e-Learning modules. If business units require additional training they are responsible for providing this to their users. Our results indicate that a lack of work-process related training, internal influences among business units and unsuccessful approach towards "out-of-the-box" implementation may serve as underlying factors influencing benefits realisation. However, one must have in mind that the organisation is in an early phase of the post-period.

In accordance to the management involvement, the unique anchoring in top management does not enlist the need for continuous distribution and awareness of the importance of the collaboration process. Users' awareness for top management involvement is limited to members of the core project group, and for the rest of the users it is absent. The effects of this are unfortunately not enlisted in our discussion due to lack of information on this area.

8 Recommendations for Statoil

As illustrated in our results and discussion there are several issues that the organisation must take into consideration to obtain the full potential of the solution. By discussing our results we have identified what benefits that have been obtained in accordance to possible factors influencing achievable benefits. These were presented in table 15. According to a benefit management view the identification of achieved and not achieved benefits are done to decide whether remedial action can be initiated to obtain them, or if they have to be foregone.

In terms of the post-implementation phase the organisation is in it is logic that many benefits not yet are fully realised, and in light of prior research most of the not realised effects are familiar in terms of early IS implementation evaluations. Our result indicates that a distinction was necessary to make round process actions and actions specifically related to underlying functionalities in the solution.

8.1 Process actions

Process actions represent actions that do not require any changes made to the technology, and that entirely rely on the manner which things are organised. These actions can be closely related to what is stated in the section on assessing value from IS investments (c.f. 3.1) in that one by managerial actions may influence the potential benefit derivable from the investment. In general the recommended initiatives is focused towards assuring a more simplified collaboration and content management process, not through changes in technology, but through the managerial actions described below. Table 16 gives a brief overview of the challenges and recommendations.

Table 16 - Challenges and recommendations

Challenge (s) hindering realisation	Remedial action
Disparity in work and benefit	• Demonstrate the collective and indirect benefits of the solution to users • Highlight aspects of the solution were benefits are more likely to occur for each individual.
Comprehensive and technologically focused best practices for collaboration	• Review and adjust BP necessarily and in timely fashion to meet the requirements of business unit processes
Disruption of social processes	• Increase awareness for the criticality of shared information • Implement guidelines for security issues involved in content archiving
Technologically focused eLearning modules	• A review of available alternatives, and additional change if necessary • A Possibility to measure amount of users' that have gone through eLearning modules.
New structure	• Maintain increased focus on collaboration and CM • Increase user knowledge and competence about new system of concept

8.1.1 Disparity in work and benefit

The users' perceived benefits of the solution seem to influence the realisation of goals. This is related to the features requiring group interaction, or in other words the shared information spaces and collaboration functionality. A collaboration technology will never provide the exact same benefit to each user. As pointed out by Grudin (1994) it is possible to reduce the impact this issue will have on benefit realisation by demonstrating an application's collective and indirect benefits to the users.

From the Statoil context this may include demonstrating to the users the collective benefits of having a common "pool of information", in general show and highlight that this will bring future benefits in terms of reuse and traceability of information. Further it becomes critical that users are aware of the importance of uploading, creating and sharing "team-based information" in teamsites. Information that is not "private" must not be stored privately, and to highlight and increase users' awareness towards this issue is crucial for the realisation of further benefits.

8.1.2 Comprehensiveness and Technology focused best practices

As table 15 illustrates, the best practices seem to be too comprehensive and technology focused. According to Munkvold (2003) the development of appropriate best practices is a timely dependent process that requires time to build experience in use of the technology.

In Statoil we therefore recommend a review of the best practices in order to adjust them to fit the actual work processes in a more definite manner. This can be done through a careful review of the ones that are available and adjust them necessarily. This must be a continuous approach as organisational changes may affect work processes over time, something which in term must be reflected in the best practices. To demonstrate best practice to users in their day-to-day work processes may increase its effect.

8.1.3 Disruption of social processes

As stated in Grudins (1992) eight challenges facing groupware implementation collaboration technologies may disrupt social processes. Table 15 illustrates that the new and powerful search engine finds content of sensitive or confidential manner, something which in terms hinders the potential realisation of benefits obtainable from the new search engine.

In Statoil the challenge becomes to make users aware that protecting their information won't do any good. To demonstrate for importance of having content available and "not protected" in the archive may be necessary for the users. However, by using one single archive there will be content that should be protected and confidential. We therefore recommend some common guidelines describing security issues in relation to content so that users share the same understanding of what types of information that should be common and available to everyone, and what information that should be confidential and protected.

8.1.4 Unsuccessful approach towards "out-of-the-box" implementation

In terms of training, a rather unsuccessful approach towards an "out-of-the-box" implementation has brought about some challenges that may have hindered benefits realisation. The importance of training can in reflection to prior literature not be emphasised

enough. The Statoil case provide us with yet another example that lack of, and too technologically focused training does not meet the business units' work processes to the degree that is necessary.

In accordance to this, we would recommend a comprehensive review and challenge of the training initiatives in relation to the users competence level to decide whether more process related training should be initiated or not. In addition, since the training initiatives mostly are based on e-Learning modules we recommend that a possibility to measure the amount of users that actually has gone through these modules is implemented to get a more definite indication of whether the implemented training is used extensively or not.

8.1.5 New Structure

A change in structure has obviously been a hinder in the realisation of a simplified collaboration and content management process. This may also be the main challenge facing realisation of benefits, because a change in structure has lead to a major change in users' work processes.

In the Statoil case the challenges that have emerged based on the new structure seem to be timely dependent. Implementation specific factors like training, hands-on support, guidelines for use and increased user awareness towards the importance of collaboration can be initiatives that reduce the possible "pitfalls" of a change to a new structure. Further we recommend a continuous pressure on maintaining the increased focus on collaboration from top management. By making the users aware of the collaborative benefits and contributions the solution may have on their day to day work processes, the change process may be easier to carry through.

Additionally the new structure has introduced a new system of concept in terms of metadata. Users do not have enough knowledge and competence in utilising this concept to its full potential. We therefore recommend initiatives that make users more competent in using and attaching metadata to content. Metadata is crucial to the benefits realisation of the solution, something that also should be reflected in the focus on these notions.

8.2 Functionality specific actions

Functionality specific actions represent actions where improvement of technology may be appropriate to obtain the potential benefits.

8.2.1 Improve search functionality

The search tool (FAST) is emphasised as one of the "cornerstones" in the solution. Concerning the problems and challenges highlighted in our discussion we believe it is necessary in accordance to the actions presented above to improve the search functionality. This then in terms of assuring to an increased degree that users do not find too much information they are not in need of, and more easily find what they are in need of. As we have not enough competence about the search technology included it is difficult to recommend definite initiatives. However, by initiating more detailed studies of the users' search behaviour Statoil may find relevant results to how they can form best practices towards searching the intranet, which in terms may lead to initiatives making users more competent in utilising the potential of the search tool.

8.2.2 Improve alert functionality to simplify the archiving process

Our results indicate that the solution support the entire contents lifecycle in a good manner. However, a problem concerning easy archiving of information is that this makes it possible for users to archive documents as “drafts”. As our results indicate, documents should be made “final” before they are filed. Statoil can solve this problem by easily implementing functionality that gives the user an “alert” if they try to file content that is not set to “final”. This way the organisation will obtain an archive with just finished documents, and will help to enhance the quality of the content archive.

9 Conclusions

With foundation in our results and discussion we will in this part draw some conclusions to whether Statoil has obtained the potential benefits from the eCollaboration solution or not, and discuss implications for further research and practice.

9.1 Main findings

Our study shows that initiating and implementing a comprehensive eCollaboration technology is a challenging and comprehensive task. In terms of the benefits management process developed by Ward and Murray, (1997), we identified that Statoil has carefully planned and identified benefits, i.e. the effect goals, in order to more easily being able to evaluate the realised benefits after implementation.

By structuring and discussing our results, we identified several important aspects of the solution which may have contributed to the benefits obtained, and to future potential benefits. By selecting a solution with Windows based functionality for production and coordination combined with a common user-interface and increased focus on collaboration the organisation has laid a good foundation for a simplified collaboration and content management process. However, at this state of time the full potential are not obtained, and the more individual based tools for coordination and information exchange (e-mail and calendar) dominate the users' good experiences. Our study supports prior research in that obtaining the full potential of tools where success depends on group interaction is a more difficult and time dependent process. In general we here refer to the teamsites and the archiving process, were successes depend on users' input to a shared information space and the common archive. One of the cornerstones in the new solution is the possibility to cross search through the organisation through a new and improved search engine. Our study shows that this tool indeed provides the organisation with increased accessibility to information, and that the organisation's information sharing environment is more open by using a "single pool of information". However, there are barriers affecting usage.

The barriers influencing full potential of the solution are well known and documented in prior research. In general experiences with prior solutions, incorporated work patterns and a major change in users' work processes affect the outcome. In addition lack of work process related training; new system of concept (metadata with underlying notions) and organisational culture have been relevant barriers to benefits realisation. In addition to the barriers highlighted above one main barrier involved when assessing the value from the eCollaboration solution was identified. The general time perspective seems to moreover have a characteristic effect on the situation the organisation is in at this state of time. We here refer to the early post-implementation phase Statoil is in and prior research which suggests that benefits are more likely to occur a while after implementation. It seems like the solution at present time does not provide a significant impact on organisational performance. However, the solution seems to have impact on individuals to some degree, and the potential the new solution provides for increased value through more effective collaboration is most definitely present.

By basing our approach on identifying benefits according to the well designed effect goals we, according to a Benefits Management approach developed some recommendations in terms of remedial actions for future changes. Based on the barriers influencing benefits realisation we found that most appropriate initiatives for future benefits realisation had to be based on managerial actions. This in terms of well known theoretical principles like continuous review of and challenges to best practices, effective distribution of information

crucial to the solution's success, stimulation of competence and knowledge and a continuous pressure from top management to maintain focus on collaboration. Despite of some recommended changes to for example the search engine, the "soft" approach to this research made us not focus too much on the underlying technological modifications that may have affected benefits realisation.

Summarized, the main impression is that an enterprise-wide implementation like the one in Statoil requires time to build experience, both in using the technology features and developing appropriate guidelines for use, to actually utilise the technology to its full potential. In accordance to previous research our main impression is that despite of prior experiences with collaboration technology, the organisation falls into many more or less known pitfalls concerning information and collaboration technology implementations. The reasons are not entirely obvious, but going back to the project initialisation period, it seems like the arguments that "sold in" the solution may have been too optimistic. With this said, we do not have enough information to draw any conclusions to this matter.

9.2 Limitations

There are some aspects of our study that comprise certain limitations. First, in terms of scope the project involved several possible main areas of research. In example collaboration technology, human resource management, enterprise content management and different approaches to evaluate information technology. As there were so many different angels concerning the project, it was difficult to cover everything to a large enough extent within the time frame of this project. Second, the amount of respondents was not more than thirteen. In terms of a wide-scale evaluation study this is not a big enough selection, so our results can only be seen as indication on what that is the general organisational impression of the new solution implemented. Lastly, our study to a large extent covers the solution as one large "partition", not diving down into the different tools and investigating their underlying functionality. This is because we focused our study around the effect goals, and we think that the scope would have been too large if it should include all the different tools in the solution.

9.3 Implications for future research

We have identified several implications for further research. These have been divided into Statoil contextual implications, and more general implication for further research within the area of Information technologies. This section will describe the implications for future research.

9.3.1 Statoil

The search engine was a central feature in the new solution. By only interviewing 13 respondents, whereas approximately half of these were involved in the implementation process the impression concerning this tool was limited. According to this, a very interesting field of future research would be to investigate the impact of intranet search tools like this to a more extensive degree. This may build further on the work done by Stenmark (2005) in terms of investigating users search behaviour towards intranet search engines.

As mentioned, we have paid little attention to the explicit tools in the solution, but more or less viewed the solution as a whole. It would be an interesting further research to do a more detailed quantitative evaluation that covers each separate tools and functionality more deeply.

This could also be valuable for Statoil, as it would help to identify which of these has been a success, and where the benefits have been realised.

In our results and discussion we argued that equal usage among respondents using the collaborative and content management tools could be necessary to obtain the potential benefits. However, to obtain equal usage in an organisation Statoil's size may be a comprehensive and difficult, if not impossible task. To investigate to what degree this actually is possible may be a possible implication for further research.

As just a few of our respondents were involved in collaboration with partners outside Statoil, we found it difficult to make any conclusions about this function. It would be an interesting topic for further research to examine whether the solution has made this easier for the users involved. A possibility could also be to find how this has influenced Statoil's external partners, and what perception they have of the collaboration with Statoil through the new solution.

9.3.2 Information Technology Research

In the context of IS research we have identified some areas that may contribute to future research. First, our research confirms that there is a lack of work done in the area of intranet searching. Most of the work done is limited to the work Stenmark (2005) has done on users' search behaviour on intranet search engines in contradiction to public search engines. A lack of prior research combined with organisational investments in corporate intranets call for more in-depth research on the impact of corporate search engines.

Our research also revealed that the organisation conducted a rather unsuccessful approach towards training in the early post-implementation phase. The phenomena that organisations invest heavily in training and support initiatives without getting a successful approach towards it are known in literature. As there is an increasing amount of investments in collaboration technology in organisations, it would be interesting to investigate more deeply how several organisations approach training. By doing this one can provide lessons learned and more general approaches towards organisational implementation of training strategies on collaboration technologies.

Last, it would be a very interesting area of future research to do a multiple case study examining the use of an archive with one single pool of information in as opposed to an archive with data base structure. By doing this one would be able to investigate to a deeper degree what impact the use of a single pool of information actually has on accessibility and openness.

10 References

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Appendix

Appendix A – Interview guide

Innledning

1. Navn
2. om stillingen i Statoil
3. tilknytning til c@s prosjektet

Åpen del

- Fortell om dine erfaringer med løsningen C@S? ”Alt som her faller deg inn vil være av interesse for oss”.
  - F.eks. en hvilken som helst ting/situasjon som har skjedd eller ikke skjedd som du tror har noe med denne løsningen å gjøre…
  - Hvilke forventninger hadde du til løsningen? Hva er bakgrunnen for disse forventningene (har ledelsen vært klare med hvilke fordeler den nye løsningen skulle gi?)
  - Har disse forventnigene blitt infridd?
  - Hva har blitt bedre/hva har blitt dårligere i forhold til den gamle løsningen?
  - Har innføring av den nye løsningen hatt noen effekt på samarbeid i Statoil – for egen del og for organisasjonen som helhet?

Strukturert del

Simplify the collaboration and content management process through integrated tools, methods and services

Brukervennlighet

1. Hva er brukervennlighet for deg i løsningen?
2. Føler du at du behersker bruk av løsningen?
   2.1. Evt noen deler som beherskes bedre enn andre, hvilke?
   2.2. Hvorfor er noen deler lette og noen vanskelige å bruke?
3. Føler du at dine kolleger behersker bruk av løsningen?
   3.1. Evt føler du at du behersker bruk av løsningen bedre eller dårligere enn dine kolleger?
4. Løsningen inneholder mye funksjonalitet. Hva er det som gjør at du velger en ”type funksjonalitet” for en oppgave?
   4.1. Er det lett eller vanskelig å velge?
5. Er de ulike verktøy i den nye løsningen integrert på en hensiktsmessig måte?
6. I hvilken grad opplever du at den nye løsningen tilbyr forenklet støtte for de ulike deler av Statoils samarbeidsprosess? (wheel of collaboration)
   6.1. koordinering
   6.2. produksjon
   6.3. beslutningstaking?
7. Er det enklere å samarbeide med eksterne parter ved hjelp av den nye løsningen?

Opplevd nytte

- Hva har innføring av løsningen bidratt med i forhold til din arbeidssituasjon?
- Løsningen inneholder muligheten til å koordinere og strukturere dine daglige arbeidsoppgaver. Eksempelvis kan du bruke "private documents" funksjonen til oppbevaring av private dokumenter. Hvor vesentlig er det med slik personlig rettet funksjonalitet for å utføre dine individuelle oppgaver i din arbeidshverdag?
  - Løser du individuelle oppgaver lettere og mer effektivt?
- Løsningen inneholder mange muligheter for samarbeid. Eksempelvis vil det være mulig for deg å planlegge et møte for inviterte deltakere. Hvor vesentlig er det i din arbeidshverdag at løsningen inneholder slike samarbeidsrelaterte muligheter?
  - Løser du gruppeoppgaver lettere og mer effektivt?
  - Er samarbeid med kolleger lettere og mer effektivt?
- Hva slags funksjonalitet ser du som helt essensiell for å utføre dine daglige arbeidsoppgaver?
  - Dekker løsningen de behovene du har?
  - Er det mye unødvendig funksjonalitet i løsningen (som kan forvirre) eller er det noe du savner?

Bruk

1. For å få en indikasjon på hvordan ulike brukere benytter seg av løsningen vil vi gjerne vite hvilke deler av løsningen du bruker mye.
2. Er det noen oppgavetyper i din hverdag som gjør bruken av noen funksjoner mer aktuell enn andre? (eks. mye arbeid i team gjør at bruk av samarbeidsstøtten i løsningen er mer aktuelt enn bruk av personlig arbeidsflate)

Auditable (and quality) content management throughout the contents entire lifecycle and the entire collaboration process

1. Hvordan vil du beskrive dine muligheter til å administrere dokumenter i løsningen?
2. Beskriv følgende:
   2.1. Hvem eier dokumentet du jobber på?
   2.2. Hvem avgjør og setter dokumentstatus?
3. Føler du at løsningen støtter administrering av dokumenter gjennom hele livssyklusen? (authoring, editing, routing, approving, publishing and archiving)
4. Hvordan vil du beskrive brukervennligheten i forhold til å administrere dokumenter?
   4.1. Likt/konsistent/standardisert gjennom hele løsningen?
   4.2. Lett forståelig (organiseringsstrukturen på dokumentene)
5. Hvordan vil du beskrive samarbeid med kolleger om utforming av et dokument i forhold til Kommunikasjon, Dokumentrevideringer/endringer, Produktivitet, Effektivitet (tidsbesparelser i forhold til tidligere løsning), Kontroll og Kvalitet

Improved search and retrieval processes

1. Hvordan vil du beskrive dine muligheter til å søke etter/finne innhold/dokumentasjon i løsningen?
   1.1. din oppfattelse av tilgjengelighet
   1.2. hva slags informasjon er lett å finne/hva er vanskelig?
   1.3. Gjør det søket lettere å kunne velge kriterier o.l.?
2. Hvor viktig for deg er det at løsningen inneholder en slik søkefunksjon?

3. Kan du gi oss et eksempel på hvordan du går frem når du søker etter informasjon?

Implement Statoil best practices for collaboration

1. Hvordan vil du beskrive din bruk av ”best practices” når du er i interaksjon med løsningen? (gjerne et konkret eksempel)
   1.1. Tilfredstiller behov?, brukervennlig?
2. Bruker du ”best practices” aktivt når du er i interaksjon med løsningen?
   2.1. Hvorfor/hvorfor ikke?
3. Er det nødvendig med slike ”best practices” for å utføre dine daglige arbeidsoppgaver?
   3.1. Vanskelig løsning?, mer effektiv?, mer produktiv?

A trained and able organisation using Statoils best practices for collaboration and content management

1. Hvordan vil du beskrive tilpasningen av opplæring/trening i bruk av løsningen?
   1.1. Tilpasset i forhold til kompetanse?
   1.2. Tilpasset i forhold til arbeidshverdag (lærte du å bruke de funksjonene som er relevante for deg?)?
2. Føler du at opplæringen du har fått er tilstrekkelig for å bruke løsningen hensiktsmessig?
3. Kan du beskrive prosessen du går gjennom hvis du ikke vet hva du skal gjøre?
   3.1. Supportfunksjon, best practices, forhøre seg med kolleger etc.

A management understanding the importance of managing the collaboration and content management process

1. Føler du at ledelsen har en god forståelse av din arbeidshverdag (behov for samarbeid)?
2. Føler du at ledelsen har en god forståelse av viktigheten av å administrere samarbeidsprosessen?
3. Føler du at ledelsen har en god oppfatning av hvordan de ansatte bruker samarbeidsverktøy i sin arbeidshverdag?
4. Føler du at involvering av sluttbrukere i utvikling av kravene til løsningen på noen måte har bidratt til den endelige løsningen?