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The Role of Change Management in IT Systems Implementation

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ABSTRACT

Implementation of IT Enterprise Systems triggers an inevitable organizational change. Managing an IT driven change requires a holistic approach to IT implementation. Such changes require an integration of best practices in project management, risk management, HR management, business process modelling, knowledge management and software development. This chapter provides an introduction to the role of change management in IT systems implementation and describes the BEST methodology with three case studies from Norway and Israel.

Keywords: Change Management, Risk Management, Reference Framework, Enterprise Systems (ES).

INTRODUCTION

The chapter highlights the potential of an integrated holistic approach to IT systems implementation. It proposes tested approaches to harmonic Enterprise Architecture development. The chapter also provides a review of the theoretical background to holistic IT systems implementation. Several case studies from the Better Enterprise System Implementation (BEST) project funded by FP5 IST are presented to show how Change Management can facilitate IT driven Enterprise Architecture (EA) development. Some results on IT Risk Management from the FP6 IP project MUlti-industry, Semantic-based next generation business INtelliGence (MUSING) are also mentioned.

IT IMPLEMENTATION AS AN EA DEVELOPMENT PROCESS

As often reported in the literature and practice, IT systems do not achieve expectations economically, organisationally, and in terms of anticipated gains in competitive advantage. Many IT system implementation projects suffer from budget and time overruns and sub-optimal, or even detrimental results. A 2002 survey of 134 organisations in US, Africa, Australia, and Europe, conducted by KPMG (2002), on the implementation of programme management, a new integrated management method, shows that about 60% of the companies studied have experienced failed projects within the previous year, at an average cost of 12 million Euro each.
By IT or enterprise systems (ES) we refer to integrated software packages, which have been developed to support several aspects of a company's information management needs such as ERP, PDM, CRM and KM. An IT system can be used to support tasks like product design and manufacturing, purchasing and logistics (material management, production planning), sales management and distribution, finance and controlling and human resources management.

The implementation of a new IT system affects the enterprise architecture itself, touching key issues as business and organisational development. The IT implementation process triggers a complex set of change processes within the enterprises. We distinguish between issues related to IT implementation as a business development effort and organizational development implications.

IT implementation as a business development issue

An ES may integrate new tasks into the existing work processes and generate new management information. The outcome is dependent on the choice of ES and the configuration of the system. A key point is that an ES affects the work of many people in the organisation, influences work functions, but in general do not fully automates them. The overall perspective of this chapter is that Enterprise Architectures change as a consequence of implementation of an ES. We propose a Change Management methodology that is focused on key elements of an organisation and its key stakeholders throughout the implementation process. Effective Change Management requires an understanding of the impact on business of an IT system and its configuration. It is also necessary to understand which competencies are needed among the employees who participate in the change process, on the shop floor as well as in administration, at management level and others (Koch and Buhl, 2001).

From a business development perspective a significant number of ERP projects are reported as failing to achieve anticipated benefits (Appleton, 1997), putting potentially a whole company at risk. Moreover, while new information technologies promise to significantly enhance organizations' performance, much of this potential is never realized (Kwon and Zmud, 1987; Nash, 2000). There is wide empirical evidence of unproductive use of IT systems. The "IT productivity paradox" is a well known phenomenon which, in this context, means that there is little correlation between a company's investment in IT and its productivity (Landauer, 1995, Willcocks and Lester, 1999). Problems have been identified not just to be technical issues, but also organisational and social ones – and this situation does not seem to have significantly improved over time.

IT implementation as an organisational development issue

In the literature, many IT implementation related problems are characterised as organisational and related to human resources. Technical problems are only a minor proportion of the reported problems. To confirm and refine this observation the authors have analysed IT implementation processes with a reference framework that is based on a system model of organisations that centres on transformation processes in an organisation (Boer and Krabbendam, 1993).

The definition of an organisation underlying the system model is as follows:

An organization is seen as a purposeful system of people and means, which together perform certain activities or processes necessary to transform inputs into outputs that are useful for its environment, in order to achieve its objectives.

A system model views an organisation as an open system in constant development. An organisation interacts with its environment, which consists of suppliers, customers, competitors, government, and (labour) markets. The IT implementation normally affects these interactions. A set of activities is called a *process*. Processes are divided into primary, support, and management processes.

Primary processes are directly aimed at achieving the goals of the organisation. A primary process can be affected by internal and external changes with interrupts affecting its efficiency and effectiveness.

Support and management processes are needed to cope with these disturbances, both pro-actively and reactively. *Support processes* supply primary processes with resources, information and tools needed to perform their tasks.

Management processes consist of strategic, adaptive, and operational processes, each with a different scope and executed at different levels in the organisation.

People must have knowledge and skills to perform these processes. People perform processes to achieve various personal and organisational goals. Processes, people and means are co-ordinated by means of organisational arrangements. Organisational arrangements can be subdivided into structural and cultural arrangements. Structural arrangements are the rules and procedures that result from agreements made within an organisation, while cultural arrangements are the values, norms and rituals in an organisation. Structural arrangements can be designed in contrast with cultural arrangements, which can only be developed by people in interaction (see e.g., Schein, 1985 and 1996). These organisational dynamics significantly embrace the IT implementation process and influence its course.

An implementation process is usually organised as a project with a timeline, a budget and an implementation plan. The IT implementation project lifecycle is therefore divided in phases such as ‘Concept development’. ‘Initiation’, ‘Mobilisation’, ‘ES Deployment’, ‘Closing’ and ‘ES Operation’. These project phases are the body of the implementation plan and include important tasks such as eliciting user requirements, adapting the software package, introducing the ES, training the users, communicating with the stakeholders, measuring the improvements. Usually the real challenges come from unanticipated events.

RISK MANAGEMENT IN IT IMPLEMENTATIONS

All IT implementation projects carry important elements of risk, thus it is probable that progress will deviate from the plan at some point in the project life cycle. Risk in a project environment cannot be totally eliminated and must be managed. The objective of a risk management process is to minimise the impact of unplanned incidents in the project by identifying and addressing potential risks before significant negative consequences occur. Quoting the Project Management Institute (PMBOK, 2004): "Risk management is the systematic process of identifying, analyzing, and responding to project risk. It includes maximizing the probability and consequences of positive events and minimizing the probability and consequences of adverse events to project objectives." The literature provides comprehensive insights and tools for risk management (Angling, 1985, Baccarini and Archer, 2001, Chapman and Ward, 2002, 2004, Gottfried, 1989, Grey 1995, Lyons and Skitmore, 2004, Miller and Lessard, 2004, Raftery, 1994, Williams, 1996). The recent MUSING project (MUSING, 2006)

combines semantic based information with quantitative data to derive operational risks estimates as required by BASEL II accord.

In general, IT risk management should be performed in such a way that the security of IT components, such as data, hardware, software and the involved personnel, can be ensured. Risk Management encompasses three processes:

- Risk Assessment
- Risk Mitigation
- Evaluation and Assessment.

Risk Assessment is the first process in the risk management methodology. Organizations use risk assessment to determine the extent of the potential threat and the risk associated with an IT system implementation.

The output of this process helps to identify appropriate controls for reducing or eliminating risk during a mitigation process which is the next step. *Risk* is a function of the *likelihood* of a given *threat-source's* exercising a particular potential *vulnerability*, and the resulting *impact* of hat adverse event on the organization.

Threat-sources must be identified and assessed. In assessing threat-sources, it is important to consider everything that could cause harm to the IT system and its processing environment. There are three main fields that affect the Risk Identification as well as the other processes of the Risk Management approach. They are: **Technology**, which concerns the implementation of the IT system (software and hardware); **Processes**, which are inevitably affected by the new IT system and **Human Resources**, which implement the processes and use the new IT system.

Identifying risk for an IT system implementation requires comprehensive understanding of the system's processing environment. The outcome of the risk identification and analysis is a risk matrix indicating the position of each risk element in terms of probability of occurrence and impact level.

Risk Mitigation involves prioritizing, evaluating, and implementing the appropriate risk-reducing controls recommended from the risk assessment process. Because the elimination of all risk is usually impractical or close to impossible, it is the responsibility of senior management and functional and business managers to use the *least-cost approach* and implement the most appropriate controls to decrease mission risk to an acceptable level, with minimal adverse impact on the organization's resources and mission. Risk mitigation options include:

- Risk assumption. To accept the potential risk and continue operating the IT system at a lower risk level.
- Risk Avoidance. To avoid the risk by eliminating the risk cause and/or consequence.
- Risk Limitation. To minimize the adverse impact of threats.
- Risk Planning. To develop a risk mitigation plan that prioritizes, implements, and maintains controls
- Research and Acknowledgment. To lower the risk of loss by acknowledging the vulnerability or flaw and researching controls to correct the vulnerability
- Risk Transference. To transfer the risk by using other options to compensate for the loss, such as purchasing insurance.

Evaluation and assessment is the last phase of the Risk Management process. The purpose of carrying out this phase is to ensure that the assumption and estimates made by the risk management team are valid, during the evolution of the project. This phase of the risk management process is also the trigger that initiates the next phase, providing material for the identification of new risks. For more results on IT risk management see the MUSING website www.musing.eu.

MANAGING IT DRIVEN CHANGE

IT system implementation processes are usually complex and involve several different components, many people, and even different organisations. We describe the complexity of enterprise system implementation processes in more detail below, including a discussion of the dynamics of the process.

The complexity of IT implementation

Implementing an enterprise system in an organisation is a complex process. Besides the new technology, its impact on the organisation involves processes, tasks, knowledge and skills, hierarchical levels and relationships with clients and suppliers. An implementation process is typically performed as a project, with an organisation that is different from the routine day to day permanent organisation. Such a project encounters many uncertainties, which cannot be all predicted or prevented from the beginning of the project. An enterprise system implementation project can therefore be considered as an organic structure (Burns and Stalker, 1961). IT system implementation processes are often treated as a technical endeavour, while they should be considered as organisational change (Leonard-Barton, 1988; Orlikowski, 1992, Davenport, 2000). They are also often considered as an imperative for change, while organisational change needs to be the starting point (Markus and Robey, 1988). Implementation of technology, with an impact on several functions and levels of an organisation, not only induces organisational change, but also requires organisational change.

Typically the goals for change are often not very clear before implementation starts; moreover, implementation efforts are sometimes discontinuous creating more uncertainties. There may be a large time lag between successive implementation efforts and knowledge and skills built in one project are often lost before the next one starts.

Alignment between an enterprise system and the existing technology, or the enterprise system and the organisation is an important aspect. For example, traditional functional differentiation impedes IT implementation, as the enterprise system requires a cross-functional process perspective, not just a narrow departmental or divisional perspective. Centralisation/decentralisation is another aspect an implementation project has to deal with. While a centralised IT architecture increases efficiency, local profit responsibility or decision autonomy is often not supported in the ERP system (Moch and Morse, 1977).

The project organisation may not be suitable for the complex task of implementing an enterprise system. Often, the number of people in the project is inadequate. Moreover, people may be insufficiently qualified. Finally, technical aspects are important and need to be understood by the people in the organisation affected by the system. The possibilities and benefits of the system are not always clear. Employees and middle management have usually very limited involvement in system definition and implementation and thus lack ownership (Welti, 1999).

Enterprise system implementation is a journey, requiring judgement and change of directions all the time. As a result understanding of the complexity of implementing and operating/running enterprise systems needs to be developed, while taking all the aspects touched upon above into serious consideration. To this end, a combined understanding is necessary, going beyond the merely technical aspects of implementing and operating an enterprise system. In particular, an understanding is needed of the dynamics of an enterprise system implementation process.

The dynamics of IT implementation

All commercial enterprise system have an inbuilt general and detailed "organisational model", together with predefined generic business processes for almost every work process in a company. The organisational model of the enterprise system has to be incorporated in, or has to be aligned with, the existing formal and informal work processes of the company. These include principles of design, production, workflow, management hierarchy and internal and external co-ordination. Therefore, aligning organisation and enterprise system implies that the formal and informal organisation interact with the enterprise system and its implicit organisation model. Such alignment requires organisational change.

Organisational change cannot be fully predetermined. People involved in the process of change influence the process, while also changing circumstances may require a change in the direction to go. As such, an enterprise system implementation process is a dynamic process, formed by the participating actors, their knowledge, interests and social competence, but also constrained by the existing structure, norms and rules.

Organisation and technology co-develop during enterprise system implementation requiring mutual adaptation and alignment during and even after the implementation process (Markus & Tanis 2000, Orlikowski 1992, Leonard-Barton 1988). As an enterprise system implementation process is social in nature, the social environments of participants in an enterprise system implementation process might largely differ. For example, the social context, organisational culture and other social factors of enterprise system developers often differ largely from those of end users (Barley 1986). As such, different social contexts add to the complexity of implementing technology. Barley (1986), for example, has observed that comparable starting situations for adopting and implementing new technology may lead to different outcomes due to organisational and people differences.

Dynamics are inherent in enterprise system implementation. An optimal set of initial conditions is neither complete nor sufficient. However, learning from dynamics, identifying recurrent patterns, might help to achieve a better start by enhancing awareness of what could happen, and proposing a course of action when needed.

Deviations from an implementation plan are not necessarily always negative. Situations may change because of various reasons, within or outside the control of the people involved in the implementation process. Some changes may create new options or challenges for the implementation process, while others might endanger a successful implementation process outcome. The term "disruption" is preferred to the word 'problem' to indicate the complex character of the process – including both internal and external, favourable and unfavourable, intended and unintended, expected and unexpected situations, which require immediate action.

Dynamics of an IT implementation process relate to the business in terms of the reasons for change, the goals to be achieved with the change, and the amount of change necessary to achieve the goals. They also relate to the implementation and change process itself in terms of determining the change coalition, configuration of the new technology and organisation, preparing the organisation for change and handling post-implementation issues. Finally, they relate to the enterprise system technology in terms of learning about the technology and its potential, identifying the role of IT and the package selection and developing a program to align the ES and the organisation. In any case, dynamics involve handling disruptions and their impacts, organising participation and communication and facilitate organisational learning and knowledge gathering. All this has an impact on the development of a fit EA.

The BEST holistic change management approach

Given the growing significance and high risk of IT implementation projects, much research has been undertaken to develop better understanding of such processes, in various disciplines. Yet, the literature on ESI, information technology and organizational change management does not give substantial and reliable generalizations about the process dynamics and the relationships between information technology and organizational change. In order to fill this gap, a European FP5 project, **B**etter **E**nterprise **S**ys**T**em implementation (BEST) was launched in 2002 (BEST, 2002). The aim of the BEST project was to understand the dynamics of IT implementation processes, and to help improve an organization's readiness to deal with such issues by acquiring knowledge of process dynamic from existing IT implementation projects. This general area is known in the literature as Change Management.

A holistic approach encompasses an effort to discover and take into consideration all the issues that the complexity and dynamics of IT implementation entails. The first part of this task will be an effort to structure the enormous volume of unstructured information about the IT implementation process that can be elicited. This demanding task has led the BEST project to the creation of a reference framework. This framework is used to capture knowledge and information from a number of sources. Based on this framework the BEST assessment tool has been developed to produce a snapshot of the IT implementation process at a specific point in time. Based on this holistic, still punctual, understanding of the process the final effort is to highlight the change actions to be taken to secure a successful continuation.

The reference framework is aimed at recognising dynamic patterns, understanding the complex dynamics of IT implementation projects and capturing their complexity, organising data collection, preparing for statistical analysis and visualise the results

for IT implementation professionals. The reference framework addresses the view of the overall enterprise characteristics and constitutive elements, which influence the implementation of an ES. The framework identifies important technical as well as organizational and human aspects that play a role in several processes. These processes are called dimensions and include the Business process, the Project Management process and the ES process. A more detailed definition of the three dimensions is listed below:

- The *permanent **business** process* for which the system is implemented. The focus process consists of all activities that will be supported or affected by the new enterprise system. The business processes are permanent processes, which may be subject to change continuously. The word permanent is used to distinguish the daily tasks from the temporary tasks of an implementation project.
- The *design and tuning of the new **enterprise system.*** The focus process consists of all activities that are needed to adapt or tune the system and align it with the business. Design and tuning of the enterprise system is a temporary process, but may extend beyond the implementation project.
- ***Project management*** of the implementation process. The focus process consists of all activities needed to plan and monitor the implementation process, select and perform the implementation strategy, select the system and implement it into the organization, compose a project team, manage project documents, etc. Project management is a temporary process.

In addition to these dimensions the framework defines six organizational aspects. The six aspects are defined as follows:

- *Strategy and goals*. Strategy and goals are the medium- and long-term goals to be achieved and the plans for realising these goals. The strategy and goals for the enterprise system and the implementation project should match the business goals and strategy.
- *Management*. The management aspect deals with setting priorities, assigning resources and planning and monitoring processes.
- *Structure*. Structure involves the relationships between elements of the organisational system, such as processes, people and means. Structure includes tasks, authorities and responsibilities, team structures, process structure and structure of the enterprise system.
- *Process*. Process involves the steps that are needed to perform the focus process of each dimension: the primary business process and relevant support and management processes, the project process and the enterprise system design and adaptation process.
- *Knowledge and skills*. This aspect refers to the knowledge and skills that are needed to perform the focus processes in each dimension.
- *Social dynamics*. The aspect social dynamics refers to the behaviours of people, their norms and rituals. Social dynamics often become visible in informal procedures and (lack of) communication.

The 18 cells created by the intersection of dimensions and aspects are called focus cells (Buhl et al, 2004, Wognum et al, 2005). Combining aspects and dimensions generates the reference framework presented in Figure 1 below.

	Enterprise system	**Project management**	**Permanent business**
Strategy and goals			
Management			
Structure			
Process			
Knowledge and skills			
Social dynamics			

Figure 1: The BEST framework

The framework has not only proven to be useful in analysing completed IT implementation cases, but also to structure ongoing workshop processes in companies. By using a graphical presentation of the reference framework (see figure 1), people are enabled to assign their knowledge and experiences on enterprise system implementation to cells in the framework and discuss the results. Such an exercise leads to deeper insight and shared understanding of the implementation's complexity.

A readiness assessment tool as a change management tool

The goal of the BEST holistic approach is to provide a tool suitable for assessing a company's situation during each phase of the IT-implementation project.
The three dimensions and the six aspects are correlated. Following the columns of the reference framework it is possible to explore each dimension in, and elicit detailed information. Following each row gives insight in how each aspect pervades the all implementation process at different levels making it complex and dynamic.
The framework is used to elicit information trough a predefined set of questions and multiple choice answers to be used in interviews and focus groups. The answer options reflect the degree of maturity and alignment of the situation identified by the question, ranging from an immature situation or insufficient alignment to an optimal situation or optimal alignment. For example, a high maturity level for the knowledge in the business of the enterprise system that is being implemented indicates that people in the business know and understand the enterprise system. Similarly, a low maturity level for the knowledge and skills in the permanent business to work with the system indicate that the people in the business are not fully ready to adopt the enterprise system.

Software is also available to gather this information and visualize it through a spider diagram. This software was developed by the BEST project consortium in 2004. It has been tested extensively by 10 experts related to the consortium, in 11 companies and by 10 external experts (Ma et al., 2004) with promising results.

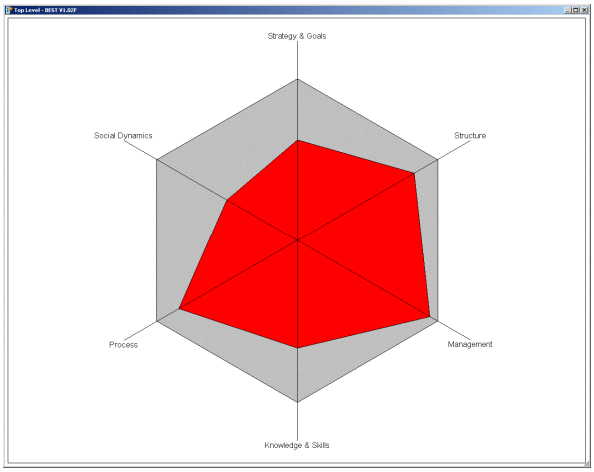

Figure 2 Spider diagram resulting from the prototype tool

The red area in the spider diagram is the "maturity score" resulting from the connection of the overall score in each aspect-axis.
Although the problems captured are not different from those that can be found in the literature, the tool provides a means to develop a comprehensive overview of and insight into all dimensions and aspects that play a role in implementing a new IT system and puts problems into perspective.

THREE CASE STUDIES

This section reports on three case studies of change management initiatives taken in parallel to the Enterprise System Implementation (ESI). The first case involves the deployment of a Product Data Management System in a large engineering firm. The second case involves the implementation of an ERP system in a Research and Development environment, quite a unique experience. The third case describes the blue print phase of a SAP implementation in a large health care organization serving over three million members. The context of each cases is first described and complemented with the specifics of the change management effort. In addition a section providing an assessment of the ESI is provided with lessons learned and gained insights. The final section of the chapter provides overall conclusions and direction for further research.

Case 1: Implementing a PDM system

Case description

N1 is a global technology services group with a company founded in the beginning of 1900. N1 employs several thousand people world wide. N1 is also a leading provider of exploration and production services, solutions and technology to the international petroleum industry. In the late 1980s, N1 purchased a relatively new Product Data Management system (PDM) from a small US based start-up company and installed it to assist in managing the engineering processes. This system became the source of the product design file information, which was subsequently loaded into the manufacturing system to plan and execute production. In 1993, it was decided that this same basic model would be standardized and implemented at other N1 sites

throughout the world. A few years later, the PDM supplier was acquired by a competitor, who shortly after the acquisition, announced that the old PDM system would be discontinued in favor of their own PDM application. N1 had therefore to start the implementation of the new PDM system.

Case assessment

At the Initiation stage, the need for a new PDM system was stated by N1's top management. N1 launched a process to identify and evaluate other PDM suppliers and finally selected one as the N1's next generation PDM system. The first organization implementing the system was N1's site in Norway. Five to seven other 'sites' would have then followed the Norwegian one. The implementation process in Norway represented therefore an important pilot project that was to be used to gather experience, to chose solutions and test implementation strategies. Vital questions were: *"How to co-ordinate the user requirement task when you have thousands of users spread all over the five continents? How to emphasize the workflow analyses? How to adapt the standard system provided by the vendor to fit user requirements? How to communicate the vision of the top management? How to motivate department managers? How to encourage seniors to use the new system?"* These were some of the key questions to be answered by the global implementation team. All technical and organizational challenges had to be met, and problems had to be solved before giving the baton to the next 'site'.

At the Assignment stage, the contract with the vendor was negotiated intensively. After a few months the contract was eventually signed, and a total budget of approximately 10M€ was assigned to the implementation project. No major risk management activities were carried out at this stage though. The learning process at this stage was focused on gathering information about the vendor and its PDM system. At this stage the BEST holistic approach was unknown to the company.
At the Definition stage, a 'global' implementation team was appointed to manage the task. An "introduction" plan was meant to give a detailed picture of all the tasks involved in the implementation project. The implementation team managed to edit a first draft of the plan.

At the beginning of the implementation process many decisions were yet to be taken at the headquarters, it turned out to be impossible to plan in detail all the activities for the organization based in Norway. During the planning phase it was therefore enough to produce an overall description of the expected activities. Key personnel were appointed to manage crucial tasks, such as user requirements elicitation, part classification structure, product life cycle design, etc. The challenges to be met were many: technical, cultural, organizational, and relational, among others. The BEST approach was then used to explore the situation and the results highlighted that the technical issues were attracting most of the management's attention. Nevertheless, through this approach the implementation team was discovering that human factors seemed to be a critical aspect of the implementation work. A Line Manager told us in that phase of the implementation project:

"Planning with and for the users is the only way towards implementation success".

At the Implementation stage, despite the dimension of the challenges mentioned above, any budget changes were refused by the top management. Extraordinary attention was therefore given to all critical tasks in the critical path, especially tasks

related to change orders and software development. Besides this, as a consequence of the BEST diagnosis a more general analysis was carried out to find out how the managers and future users of the PDM system would experience the change process resulting from its implementation in the organization. The analysis was more than registering IT architecture, or assessing knowledge level among the users. It was an effort to understand the learning mechanisms to be addressed.

The organizational analysis was again based on the use of the BEST framework and encompassed:

1. Collecting information about the organizational starting point.
2. Trying to predict pitfalls and challenges.
3. Highlighting opportunities.
4. Tailoring information strategy to users' knowledge and awareness level.
5. Developing a communication plan
6. Learning from future users.
7. Planning successful learning through training

This kind of analysis helps managers understand the organizational mood prior to implementation. Line managers' thoughts about the coming change process were expressed in their own words. The implementation team used BEST framework as tool to asses the changes and upgrade their general understanding of the process.
At the Benefit Realization stage the management focus was directed on the project's overall achievements. The program was completed with a few months delay. The completion of the program did not univocally parallel the benefit realization. Many features of the system were still unutilized by most users. Some users creatively invented "smart workarounds" to avoid using features of the system they did not understand. Nevertheless, after having worked side by side with many end users during the whole project, the implementation team was known and accepted by their end user colleagues, so they used their stronger social position to trigger and accelerate the learning process. An information strategy document was created by the implementation team to support a major communication campaign throughout the Norwegian organizations.

Communication activities followed all the implementation process from the very first day of the implementation project. According to the program manager, who also was the main responsible for the information strategy during the IT system implementation:

"Information and communication were based on openness and trust".

The Information tasks included check lists and questionnaires to be used in order to follow up the user learning process. The benefits achieved by introducing the new PDM system were to be fully discovered only after a couple of years of intense training and of focusing on organizational learning.

Case 2: ERP in R&D

Case description

N2 is a company in the R&D business, employing several hundreds highly skilled people. The activities of the company are mainly in Europe. For several years the

company has had a badly integrated series of software packages used to manage human resources, finance, production, and some key logistics processes. That cluster of disconnected software had an ERP like function, but could hardly be considered an ERP system. The need for an ERP system that substitutes the existing software packages was therefore very clear, at least according to the head of the administration. The general attitude to change at N2 is negative as only the core business is really in focus. As a result the administration's needs are not so visible or particularly prioritized. There was however a group of enthusiasts, mainly internal consultants with business management background, that strongly believed in the benefits that N2 could achieve implementing a new ERP system. Through lobbying and intense management buy-in activities, this group managed to get the ERP implementation process started.

Case assessment

At the Initiation stage, the CEO and the CFO considered the possibility to buy a new ERP system. The mission was not clear from the beginning, and the top management had to specify it later on. The ERP was supposed to integrate new tasks into the existing work processes and generate new management information. The outcome was in any case dependent on the choice of ERP and the configuration of the system. A key point was that an ERP affects the work of many people in the organization, influences work functions, but in general do not dictate them. This introduced the need for some form of risk management planning. The overall perspective at this stage was more business change through implementation of an ERP, while considering key elements of an organization and its key stakeholders in the implementation process. This required a deeper understanding of the impact of an ERP and its configuration, and necessary competencies of employees to participate in the change process, on the 'shop floor' as well as in administration, production, at management level and other levels. The BEST holistic approach was used to analyze the process up to that point and to plan the work to be done: The top manager explained during a focus group:
"There is continuous pressure on our organization to improve its operational, tactical and strategic processes. We can not avoid change."

Already at this point the BEST framework clearly evidenced a lack of detailed knowledge of the different administrative routines throughout the company, and a distressing degree of incongruence between IT strategy and business strategy.
At the Assignment stage, some additional analyses were carried out to figure out the budget need, as well as the expected return on investment. These analyses were performed by external consultants. The result was accepted by the CFO, who decided to allocate resources to perform the preparation work during the definition stage. According to the external consultants this stage should give:
"A sound fundament for the rest of the implementation project, as far as risk management and project resources management are concerned".
It was interestingly noted how this external analysis failed to highlight the strategic incongruence discovered earlier by the internal implementation team using the BEST framework.

At the Definition stage, the implementation process was organized as a program with a timeline, a budget and an implementation plan. The ERP program lifecycle was therefore divided in phases named 'Further Concept Development', 'Initiation',

'Mobilization', 'ERP Deployment', 'Closing' and 'ERP Operation'. These program phases should be the body of the implementation plan and should include important tasks such as eliciting user requirements, adapting the software package, introducing the ES, training the users, communicating with the stakeholders, measuring the improvements. The management acknowledged the need for organizing the ERP program with these phases. But further insight achieved through the BEST framework revealed that the real challenges come from unanticipated events, described as disturbing events or disruptions, which called for reflection and action. Most of the potential disruptions were found along the strategy-aspect axes. This made further program planning difficult, but it did not remove the need for planning, it simply changed its scope as follows:
1) Plan in order to gain understanding;
2) Plan for unanticipated events – risk mitigation.
3) Consider the original plan as a guide to the future – it is not 'the' future.

The Implementation phase and the Benefit Realization phase were never carried out. The strategic incongruence had been so clearly highlighted, that any further risk mitigation at lower detail levels was considered superfluous. During the definition stage some key top managers resigned, the reasons being not related to the ERP implementation, and this resulted in a sudden stop of any activity. Altogether the ERP project failed to achieve the anticipated benefits. The main reason was the sudden lack of program owners, and decision makers. The lobbying work done by the group of enthusiasts that triggered the whole process turned out to be useless. A general feeling of a real need for a new ERP system in the company remained though. One of the line managers interviewed after this phase stressed that
"Things take time; this wasn't but the first act of a new long and exhausting ERP story!"

A new Initiation phase is expected to start when the new top management realizes the pressing need. Nevertheless, a significant amount of structured information regarding this ERP program "attempt" has been produced thanks to the BEST framework by internal and external consultants, and gathered by the head of the administration. Answers to old questions have been partly provided; this concerned mainly business process engineering issues. Almost all departments are at this point of the process informed that a new ERP is to be bought and implemented sometimes in the near future. It can be therefore argued that the organization has achieved a deeper understanding of their need for an ERP system and a deeper awareness of the challenges to meet during an implementation process. Much of the project planning is done, and the lessons learned will turn useful as soon as the new CFO will start the new ERP implementation process.

Case 3: ERP in Health Care

Case description

N3 is a large non-governmental and non-profit health care system in Israel with 14 hospitals and more than 1200 primary and specialized clinics. Family doctors and hospital specialists cooperate to provide a broad medical-social perspective for the care of the individual, the family and the community to 3,600,000 insured members from every ethnic group and every walk of life. N3 has made a strategic decision to

implement a SAP ERP system in several implementation waves. The first wave is focused on Logistics, Human Resources and Financial modules. Following a comprehensive preparation phase, 17 specialized blueprint teams were set up to specify blueprints of processes such as maintenance, supplier management and training. The blueprints specify **Events** (When should something be done)**, Tasks or function** (What should be done), **Organization** (Who should do it) and **Communication** (What information is required to do the right task). From the blueprints business process, organization, authorization and development master lists are prepared.

In addition to the 17 blueprint teams, three integration teams, one for each of the three modules, were formed to handle vertical integration. An overall integration team was assigned the task of overall integration. Finally six horizontal teams were formed to handle issues of change management, quality assurance, interfaces, development, infrastructures and information security. Overall 27 teams were set up to develop blueprint documents. A top management steering committee supervised the whole effort and provided strategic directions and tactical priorities. Change management was identified as an ongoing activity throughout the life of the project and, in that context; several activities were performed including a mapping of CEAO chains from the work of the blueprint teams. Change Management activities were lead by the Human Resources Vice President in parallel to the SAP implementation (see Figure 3).

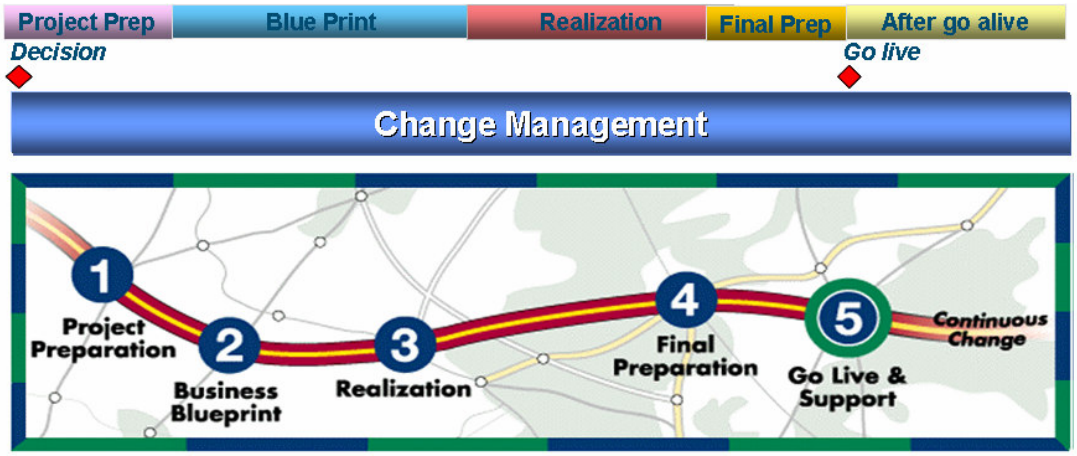

Figure 3: SAP implementation process

The detailed Change Management plan consisted of organization assessments, CEAO workshops, an internal marketing program to communicate internally the benefits of the ES, consulting and tools in change management and leadership, employee surveys and feedback mechanisms. The plan is presented in Figure 4 below.

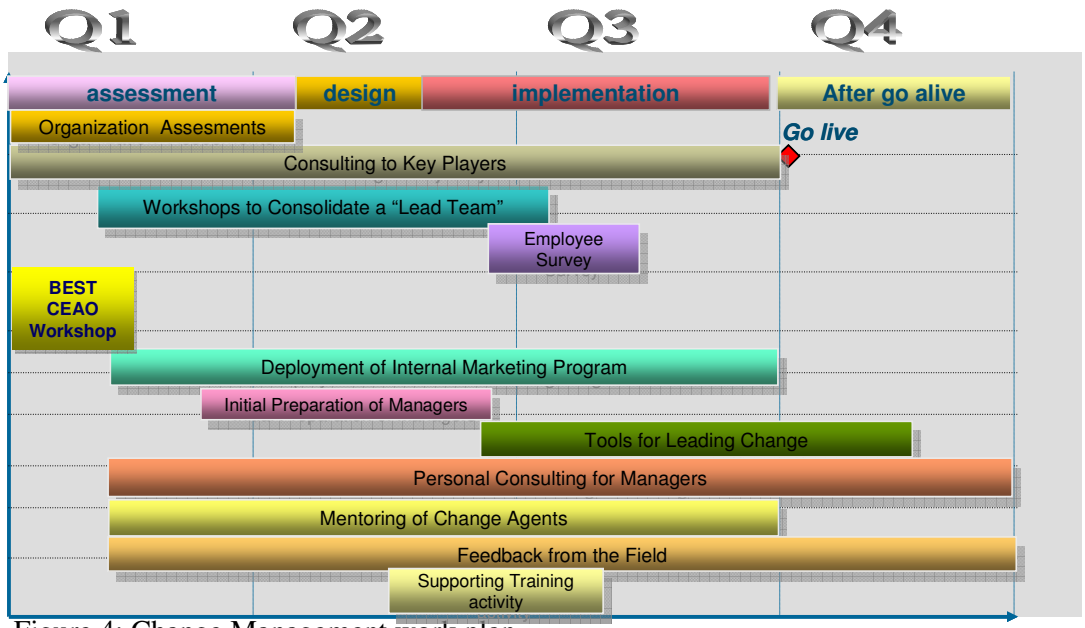

Figure 4: Change Management work plan

Case assessment

CEAO chains were identified by trained change management experts that participated as observers in the meetings of the blueprint teams. The reported CEAO chains were entered in a tailor made ACCESS application (see Figure 5).

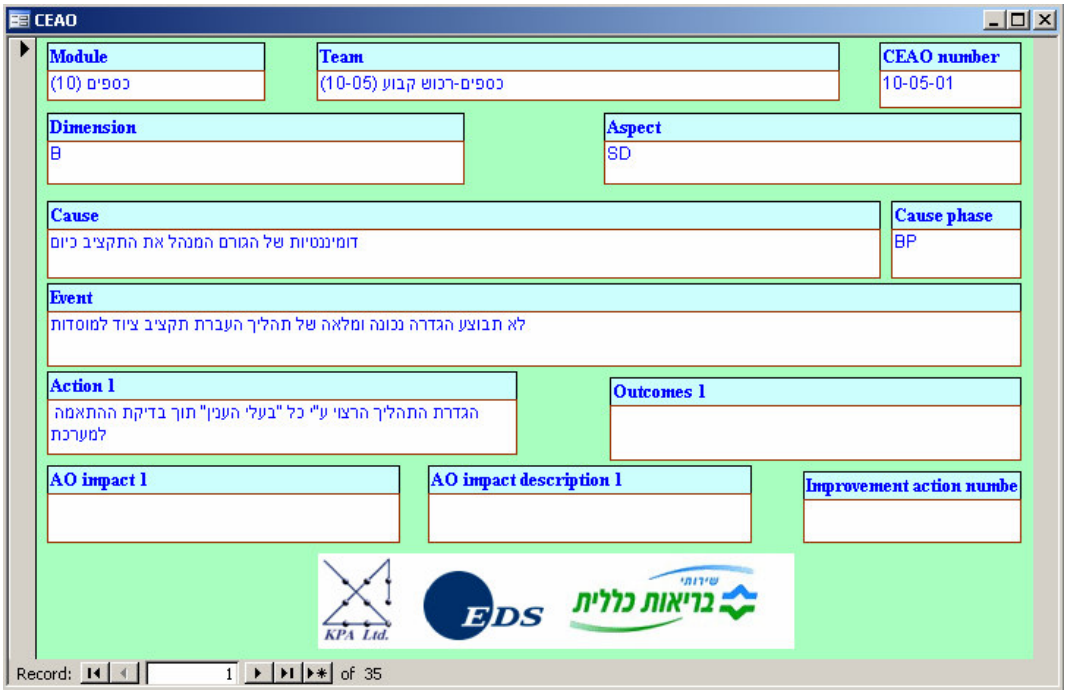

Figure 5: CEAO data base

An analysis of the CEAO data base indicated that in change management events related to the financial module, 29% are attributed to process, 23% to structure and 17% to knowledge and skills. The pro-active corrective action was to refocus the effort to a wider horizon, re-emphasize the need for providing training to affected parties and launch a focused effort to analyze structural implications from the point of view of job description and organizational charts.

CEAO chains related to ongoing business processes constituted 68% of all foreseeable events and only 6% to the SAP system. The implication of the finding was that special care had to be given to internal processes and not to the ES technology. This finding lead to a redefinition of workteams to enhance the presence of content experts as opposed to IT experts.

At the time of this writing the project is still ongoing so overall conclusions are yet to be reached. The case study demonstrates however how pro-active actions can be taken at an early stage of the ES implementation using a structured data based approach. The challenge of mapping and analyzing change management information is addressed in Buhl et al (2004) and Kenett and Raphaeli (2006).

CONCLUSIONS

The case studies were chosen based on the size of the companies, the complexity of the IT-driven EA-change process to be managed and the fact that these companies accepted to use the holistic approach presented above.

We described how traditional Risk Management approach to project management approach is used in the implementation of IT systems. However, there are a number of factors that this approach does not completely or sufficiently cover. A comprehensive risk analysis together with professional project management does not seem to be any guaranty for a successful IT implementation. Organisational stress, clogged communication lines, business strategy consistency, social dynamics and relationship to the suppliers are some of many factors that must be taken into consideration. This awareness opens new horizons for the management of IT driven Enterprise Architecture Development.

The cases studied shed light on the feasibility of an approach designed to pay attention to the dynamic elements of IT-driven EA-change and make visible their reciprocal relations. As a matter of fact all companies had experience in risk management. N2 even sells risk management services. Risk management approach was therefore the most reasonable and immediate way to face the change process. However classic risk management and project management turned out to be insufficient to cope with the complexity and the dynamics of the change process.

Using a holistic approach like BEST though was not an easy task either. The main reason for this is that the approach is new to most managers and consequently is often ignored, not appreciated or even considered as a threat to more established methods. Awareness of the resistance given by some executives to embracing a holistic approach was the key success factor in N1, N2 and N3.

The study shows how success can also mean creating the necessary insight to avoid starting an IT-implementation too prematurely. The success experienced by the BEST project should help researchers focus on these challenges, and motivate practitioners to embrace the holistic approach.

Future research involving the application of Case Based Reasoning (CBR) expert system to Change Management problems has began (Raphaeli et al, 2004). A database of CEAO chains can be used to generate best practices that a CBR system can help retrieve, thereby improving the effectiveness of change management activities. This can lead to engineering the change management effort. Such research will have significant economical implications by positively affecting the success of IT implementations. In parallel, the new FP6 IP project on MUlti-industry, Semantic-based next generation business INtelliGence (MUSING) is specifically handling IT Operational Risks and the integration of semantic based qualitative information with quantitative data. The combination of CBR and MUSING technology promises to offer innovation breakthroughs in managing change in IT systems implementation.

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