USING GROUP LEARNING TO ENHANCE THE IMPLEMENTATION OF INFORMATION TECHNOLOGY

THE RESULTS OF DISCOURSE ANALYSIS

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PROEFSCHRIFT

Ter verkrijging van
de graad van doctor aan de Universiteit Twente,
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prof.dr. F.A. van Vught,
volgens besluit van het College voor Promoties
in het openbaar te verdedigen
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door

Tatiana Vladimirovna Bondarouk
geboren op 11 augustus 1967
te Leningrad

Dit proefschrift is goedgekeurd door de promotoren:

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Prof. dr. R.J.Wieringa

En de assistent-promotor:

Dr. M.J. van Riemsdijk

To my parents

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What counts for group learning in general, is also true for writing this thesis. It is not just the final product that counts; it is mainly the process of learning and interacting with many people that has enriched my experience and enhanced my 'interpretive schemes' on carrying out research. Looking back on the last five years, the main feeling now is that it all was fun – to come to the Netherlands, to leap into IT research, to throw myself into discourse analysis, to wonder and doubt, to look for the sharp wording and rephrasing, and to grasp what my research was all about. I am sure it was all for the best. Many people walked in to my life, and I am very grateful to all those who contributed. I hope that for them the finalising of this work is a reward in itself, since I cannot thank all of them sufficiently here in person. There are, however, some people whom I want to mention specifically, for one reason or another.

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Tanya Ruël-Bondarouk
8 September 2004
Enschede

CONTENTS

1. INTRODUCTION

This thesis is about the implementation of information technology (IT). You may well ask whether that has not already been sufficiently explored and described. Indeed, this topic was raised decades ago and has been the subject of discussions ever since. However, the field is still confronted with the so-called 'go-live' problems such as employees' dissatisfaction with newly introduced systems, the mismatch of a new technology with the existing infrastructure in a company, an underestimation of the technological complexity for employees, and inefficiency in the end-user support.

After many years of IT use in organisations, and despite (or, perhaps, because of) dramatic technological changes, these problems are still as relevant today as they were in the past. How can one ensure project completion within budget and on time? When rolling out a new system, why do users complain? Why does the espoused use of technology differ from the real one, and why do so many projects fail?

Struggling with these questions, even in the final stage of our research, we entered a large public organisation to conduct our final case study. This company had introduced a SAP® package to its personnel and salary administrators. After a week of investigating, we realised that the difficulties experienced by the users could be compared only with an *avalanche*: unpredictable, escalating, and apparently unmanageable. For eight months with only a vague image of how to make inputs into the system, greater work pressure than ever before, countless mistakes in the personnel administration leading to incorrect salary payments to tens of employees, and painstaking efforts by the project team to steer the implementation, the administrators lived a roller coaster ride resembling a nightmare. We spent six months in the company for the case study, and were almost convinced the problem must be with SAP®, when we got involved in yet another IT implementation case study at Belgacom (Brussels).

Belgacom introduced a digital HR portal to its employees and managers, who all acquired the possibility to view, modify and/or confirm data in the HR administration area. Already by the second week after the introduction, more than 80% of HR-related transactions were done through the digital portal. The few emerging difficulties in using the system were resolved by group discussions, recurrent evaluations, focus groups, etc. Useless functionalities were cut out of the system, while other, important tasks to be performed were added by the Belgacom specialists. Painstaking efforts by the project team did not appear a waste of time at all, but seemed to pay off. About eight months after the introduction of the system, the majority of the employees were used to working with the digital portal. In light of our earlier experiences, we naturally asked the e-HR manager what kind of software they were so lucky to have. "A good but standard one", was the answer, " SAP®" (Ruël et al, 2001).

These two examples help us realise how differently IT projects can develop, even when using the same technology. But then, if it is not the software, what makes the difference? We share the belief of many scientists and practitioners that people are the engine that can get moving or slow down, improve or break, IT

implementation (Bardram, 1998; DeSanctis and Poole, 1994; Orlikowski, 1996; Ruël, 2001; Fehse, 2002; Hettinga, 2002).

There has been much research and follow-up recommendations on how to introduce a new IT to employees in order to minimise or avoid troubles during IT projects. However, such projects are still known to be time consuming, indirect, and sometimes impulsive developments, leading to a mismatch between the initial ideas behind information technologies, and the real use, the employees' perceptions and their experience. This phenomenon is known as the journey from the espoused to the enacted use of IT.

Maybe, it is time to ask the end-users, those who are at the centre of the implementation, and try to see, feel, and comprehend their opinions? We think so, and thus, in our research, we have attempted to grasp the 'human side' of IT implementation. How do employees get used to a newly introduced system? Why do they complain about seemingly perfect technological inventions? Can we bridge the gap between the aspirational ideas behind IT and the work reality of the users, and how do we know if the gap has been closed? These and other questions guide us through this thesis.

However, to begin, let us first elaborate on the basic concepts: what kind of information technology is at the centre of our study (Section 1.1), and what are the main challenges in IT implementation (1.2)? Following this we will introduce our approach to understanding the human side of IT (1.3 and 1.4) and state the research goal and main research question (1.5). Finally, in this chapter, we will outline the rest of the thesis (1.6).

1.1 GROUPWARE AS THE FOCUS OF THE STUDY

Our research focus is on one specific type of IT, one which aims to support collaborative work. Such systems are commonly called groupware, or collaborative technologies. The word *groupware* itself is interesting. What does it mean, is it just another *-ware* (software, hardware, shareware, freeware, photoware, brainware, officeware), and what is the role of *group-* in the term? Looking at the theoretical and practical developments of groupware since the 1960s, we will show that the emphasis in the term *groupware* has gradually shifted from the *-ware* to the *group-* part of the word. This allows us to broaden our understanding and to introduce our definition of groupware.

Holtman (1994) recognised four generations of groupware: basic groupware (1960s), educational (1970s), commercial (1980s), and diverse groupware (1990s). In our view the beginning of the 2000s has brought the next, *multiple*, groupware category.

1960s. The basic functionalities of 'shared multimedia' appeared in the 1960s from a groupwork experiment with very basic equipment initiated and sponsored by the US Military and invented by Douglas Engelbart of the Stanford Research Institute. Engelbart still had serious problems with the quality of displays–VDUs were at the beginning of their development and the output was via a TV-style display. However, this experiment was the first mix of text and video on a single screen. The term 'groupware' was of course unknown at that time, but it was a form of shared technology two decades before people had even heard of the term.

1970s. The era of educational applications of groupware began. First, it was for university "distance learning" purposes. Secondly, groupware products supported groups of teachers who wanted to communicate at different times. Holtman (1994) distinguishes three notable educational groupware areas. First, the EIES–Electronic Information Exchange System–from the New Jersey Institute of Technology which provided information and conferencing to distant students based on conventional telephone lines and modems. Then, PLATO–Programmed Logic for Automated Teaching Operations–based at the University of Illinois supported campus students with intersite connectivity via privately leased lines. Finally, there was the rapid growth of the Unix operating system. Unix first appeared at the AT&T Bell laboratories, and later universities and research establishments in North America took it up. This system led to a significant change in groupware orientation. Without any commercial goals, it was used by scientists and researchers, both individually and in groups, to develop small team applications and, above all, to connect to each other.

1980s. By the end of the 1970s, groupware was focusing mainly on special functions in the science and research domain. The introduction of the IBM PC in 1981/82 started a new era in business computing, one which continues to the present day. Although not initially a revolution in groupware applications themselves, the growth of the PC actually greatly influenced group work. Several reasons motivated the linking of PCs together. Firstly, the need to share databases; secondly, a top-down pressure from some IT departments to avoid the problems associated with individual PC maintenance. Thirdly, there was pressure from traditional hardware vendors seeking to retain some connectivity to their proprietary products. Fourthly, there was bottom-up pressure from the new local area network (LAN) vendors, each, unfortunately, with their own communication 'standards'.

The mid-to-late 1980s saw significant growth in group-oriented software that generally included group-decision support systems. The introduction of the most innovative groupware products is usually credited to *Lotus Notes*. *Notes* improved the business performance of people working together by reducing the time needed for everyday business processes, such as customer service, account management, and product development while, simultaneously, improving the quality of the processes (Papows and Fielding, 1994).

1990s. During the 1990s, groupware products became clustered into several broad groups and really began to attract scientific and commercial attention. Coleman (1995) has noted that groupware never took off in the 1970s and 1980s because there was insufficient network infrastructure. In the 1990s, the infrastructure was put in place, and business could use groupware to restructure itself for global competition.

Numerous definitions of groupware were then put forward. The most illustrative in our view are those of Baecker (1993, p.1), who defined groupware as any multi-user software supporting computer-assisted coordinating activities; and Ellis et al (1991), who considered groupware as: "computer-based systems that support groups of people engaged in a common task and that provide an interface to a shared environment"(p.40).

The 1990s was a period of groupware 'explosion', in which organisations were offered video and audio conferencing, Group Decision Support Systems, Electronic Meeting Rooms, Electronic Mailing, Shared Document Applications,

Shared Whiteboard Applications, Project Management Tools, Group Calendaring Systems, Collaborative Authoring Systems. The research community offered a variety of groupware typologies based on the locus of control (Coleman, 1995), the level of support, group processes (McGrath and Hollingshead, 1994), a time/space taxonomy (Ellis et al., 1991), or the application level (Put, 1996), to name but a few.

At the same time, it became apparent that groupware was at the intersection of a number of technical, economic, social, and organisational trends that had combined to propel it into the minds of managers in both the business and technical communities.

2000s. With the rise of wireless, mobile, and internet technologies on the one hand, and integrated office environments on the other, the distinction between groupware and other information technologies became blurred. While the traditional understanding of groupware, developed in the 1990s, focuses very much on the support of 'real' group work, nowadays in organisations you will find many 'fragments' of cooperative work, which are performed outside of traditional group structures yet still require IT support. Such cooperative fragments can often be recognised in various work situations ranging from document sharing, cross functional and cross-departmental projects, to incidental correspondence between employees linked by a given task. Stand-alone computers nowadays are used only for trials and experiments in organisations, while the most common situation is workstations hooked up to an organisational network. Common understanding of the way collaborative tasks are performed has also acquired a broader perspective: employees can work together: virtually, intra- and inter-organisationally, and globally. Modern collaborative technologies intervene in almost every kind of business, and in the public sector. Such a multiplicity of groupware in terms of its targeted sector, employee tasks, and the structure of collaboration, calls for a broader definition.

We therefore define groupware as *any software program that facilitates and/or induces collaboration between end-users. These can be either dedicated programs (traditional "groupware"), or embedded fragments that are part of more general applications such as ERP, CRM, and PDM.*

What is relevant from our perspective is not to what extent a system to be implemented can be classified as a traditional groupware system, but in what way its use develops through collaborative work. This means that we will focus on collaborative software packages as a new working environment for employees, who want, need, or have to get used to it.

1.2 THE IMPLEMENTATION OF INFORMATION TECHNOLOGY – MORE THAN THE PRICE OF PROGRESS

Having clarified the first focus of the study–a groupware type of IT–we will elaborate on the next focus: at the heart of our research attention is the *use* of technology. Broadly defined, the use of a new information technology is the result of an implementation process.

It is clear that implementation requires a process, but what are the beginnings and ends of that process? Led by our research interests, we will not investigate the design, prototyping, development, and other phases that take place before a system

goes live. Our investigation starts when the technology is introduced to the targeted users–that is when the implementation process begins in this study.

Even after a system has been designed, evaluated, and piloted, there is no guarantee that the targeted users will be happy with it, or that the organisation will gain the expected benefits. It is broadly recognised that 'go-live' IT use often develops differently from the plans made, and that the degree to which the use of a technology corresponds to the anticipated rules and norms can vary considerably, depending on the organisational context, the type of IT, the end-users' awareness of the system, and so on.

Here, we are emphasising the second focus of our research: we will investigate the implementation process that *begins* when a new information technology is introduced to the targeted users, and the employees have/want/need to work with it.

Robert Block (1983) noted about the implementation of IT in practice: "If I define a successful system as one that is developed *on time and within budget*; it is *reliable* (bug-free and available when needed), and *maintainable* (easy and inexpensive to modify*); meets its goals and specified requirements*; and *satisfies the users*, how many of you would say that your organisation has successful systems? I've asked this question of hundreds of people at all levels of data processing, and the overwhelming response is one of silence".

Block's experience still has a sad ring of familiarity. In the first years in this field, ITs were subject to high failure rates and, today, the situation is little better. While there have been periods during the last thirty years when IT failure has been less in the industry eye, there is no reason to think that it has become less serious (Sauer, 1999).

The Standish Group (2001) completed a longitudinal study that included a survey among IT executive managers in the United States, in which the sample included large, medium, and small companies across many industry segments, e.g., banking, manufacturing, retail, health care, insurance, services. The total sample of the survey was 365 respondents and represented more than 8,000 IT applications. The research found that, in the United States, the annual expenses on IT development were more than $250 billion in 1994. The average investment in an IT project for a large company was $2,322,000; for a medium company $1,331,000; and for a small company $434,000. In 1994, a staggering 31.1% of projects were cancelled before they were ever completed, and 52.7% of projects cost on average 189% of their original estimates. For every 100 projects started, there were 94 restarts including some projects that had several restarts. On the success side, in 1994, 16.2% of IT projects were completed on time and on budget. In the large companies, the situation was even worse: only 9% of their IT projects came in on-time and within budget. Seven years later, in 2001, the satisfaction with IT projects in terms of time and budget seemed to have increased, with 28% of projects meeting these criteria of success. However, "Nirvana was still a long way off" (Standish Group report, 2001): 45% of the IT projects in 2001 overran their original cost estimates, and 63% overran the estimated time. In total, 137,000 IT projects were late and/or over budget, while another 65,000 failed outright in 2001.

Johnson (1995) estimated that abandoned IT projects cost the USA $81 billion in 1995: equivalent to 1 per cent of GDP.

As an illustration of the 'price of progress', Table 1.1 provides an overview of the magnitude of failures with information technologies in companies. This overview is adapted from the work of Sauer (1999, p.281).

Source	Findings
Lehman (1979)	57 project survey–46% overdue (mean delay 7 months), 59% over budget.
Comptroller-General (1979)	9 project survey–$3.2m never delivered, $2m delivered but never used, $1.3m abandoned or reworked, $0.2m used after change, $0.1m used as delivered.
Gladden (1982)	Survey–75% of system developments not completed or not used.
Bikson and Gutek (1984)	2000 company survey–40% of office systems failed to achieve intended goals.
New and Myers (1986)	239 company survey–poor or negative returns on investment for CAD and CAM (46% of companies), FMS (67%), robotics (76%).
Ettlie (1986)	55 manager, 41 company survey–50% of CAM systems fail.
Works (1987)	75% of production and inventory control systems fail.
Siskens et al (1989)	63% of IT projects exceeded their budget by up to 50%, and a further 7% by more than 50%.
Ewusi-Mensah and Przasnyski (1994)	82 respondent survey–22% had abandoned more than five system development projects in the last 5 years, 69% had abandoned at least one.
Phan et al (1995)	143 project survey–25% did not meet requirements.
Johnson (1995)	365 company survey–31% projects cancelled before completion, 53% overrun costs and budget, only 12% of 3,682 current projects on time and on budget.
Standish Group Report (2001)	137,000 US projects were late and/or over time, while 65,000 failed outright.

Table 1.1. Overview of failures in IT implementations (adapted from Sauer, 1999; with additions)

Thus, experience does not encourage optimism. In the late 1960s and the 1970s, the term "software crisis" was common currency (Friedman, 1989). In the 1980s, although IT failures were discussed less in the literature, the problem remained.

The 1990s have brought more openness to further discussions on IT failures. High profile examples in the USA include the Denver International Airport baggage-handling system (delays cost more than $1.1 million per day) (Gibbs, 1994; Montealegre et al., 1996), the California Department of Motor Vehicles (after spending $45 million on an IT project to register applications, the project was cancelled) (Standish Group, 1994), and American Airlines' CONFIRM reservation system (the company settled its lawsuit with Budget Rent-a-Car, Marriott Corp. and Hilton Hotels, but after spending $165 million the CONFIRM reservation system project still collapsed into chaos) (Oz, 1994).

In the UK the disasters in the implementation of the London Ambulance Service (LAS) project that began in 1992 (Wastell and Newman, 1996; McGrath, 2002); the failures of the London Stock Exchange's Taurus Project that cost £400 million (Drummond, 1996); and the problems in the Wessex Health Authority's IT project have been broadly discussed in the media (Kirby-Green, 1993). In France, difficulties with SNCF's SOCRATE reservation system have been in the headlines

(Mitev, 1996). In Australia, Westpac Bank's CS90 failure has acquired folklore status (Plunkett, 1991) and, in New Zealand, the Education Department's failure became front-page news (Myers, 1994). As we can see, nowhere is immune.

Although the most recognised cost is still considered to be the wasted investment, there are other costs to pay for the IT "progress". These may include risks to human life and health although actual loss of life is rare (e.g. LAS), or delays in airports and other transport organisations. In many such cases there are frustrations for the targeted employees who have to perform the tasks with the technology, political processes in organisations that have to adopt to a new IT situation, and IT project teams whose dissatisfaction results from the delays in IT projects.

However, the really bad news is that this list is far from exhaustive or exhausted. IT failures clearly continue to trouble organisations. The enormity of the problem is evident. The relevance of potential solutions to all companies is high.

All this shows that, although the research problem has a thirty-year history, it remains as urgent as before: the implementation of IT is not as successful as expected, and the price is far too high. This is the starting point for our research: the realisation that the use of IT often develops through many unpredicted and often difficult modifications for individual users, groups of users, project teams, and entire organisations.

1.3 WHY HAVE WE LEARNT SO LITTLE FROM IT FAILURES?

Practice has usually learnt lessons from IT implementation informally, that is from experience. However, we could not find studies that show that organisations which review their IT failures have a reduced risk of subsequent failure. In the literature, researchers frequently complain that their recommendations are not incorporated into IT practice.

A similar approach to informal learning from experience is that of crystallising those lessons and codifying them into good practices. But again there is a lack of evidence of good practice adoption to suggest that, whatever lessons have been crystallised, that these have significantly helped to improve subsequent IT implementation (Beck and Perkins, 1983).

We believe that the problem of 'IT failures' continues because of limitations in the traditional approach to IT implementation that has dominated research in recent decades. By the traditional approach we understand the exploration and prescribing of issues: factors, circumstances, and processes that are directly associated with IT failure or success. We will fully elaborate on this in the theoretical chapter, but here we will briefly outline the historical development of the traditional IT studies that strove to understand the reasons for IT failures and successes.

The IT studies of the 1960s were mainly influenced by the software crisis, and focused on the system development problems. Either the systems did not deliver the functionalities that had been requested or, if they did, they turned out to be the 'wrong' functionalities. By the late 1970s, the dynamic of IT studies had advanced to user-centred approaches. The problem of "resistance" began to regularly emerge. The research focus moved to the users because however good a system, if

the users, for whatever reason, did not like it, they could resist and this would cause implementation problems. Two main solutions were promoted: building better interfaces as a response to understanding the users' psychology, and designing better implementation tactics as a response to understanding the organisational interests (Keen, 1981). This reflects how, up until the end of the 1970s, IT studies understood IT implementation in terms of the technical capabilities of the systems.

The 1980s brought alternative approaches, and turned research attention towards the process of IT implementation. Even more, these processes were supposed to be advanced by social issues (alignment with organisational structure and culture, and political processes involved in IT implementation). Process studies were perceived as better able to trace the causal linkages than the traditional factor studies (Markus and Robey, 1988). However, still, the research was oriented towards discovering the factors, or circumstances, that would ensure better IT implementation. Information technologies were still considered as the driver of the implementation process.

So, why have we learnt so little from IT failures? There are two popular reasons. It is argued that the traditional IT research, that focuses on the factors of IT implementation, has failed to identify the true causes of failure (Sauer, 1999). Perhaps, the traditional factors or processes are the symptoms rather than the reasons, and attacking the symptoms does not treat the disease. Another possible reason is that even if these factors *are* the causes of the IT failure, they are not easy to avoid (Kling, 1987). Perhaps a third possibility is that the traditional studies do not mirror the interactive, complex reality of the IT implementation process. Whether or not the traditional studies have uncovered the true causes of IT success and failure, their prescriptions seem to suffer from practical shortcomings. The observable, and sad, phenomenon is that organisations continue to do those things that have been identified as significant causes of failure.

The question is whether we can learn to be more successful in the future. There are new ideas unfolding in research which could result in reduced failure rates. The 1990s have advanced IT studies by trying to capture the IT implementation process as dynamic, multiple phenomena including interplay between technical, human, and organisational issues. This makes theorising very difficult and might confuse practice even further. However, in our view, if we want to learn from the IT failures, and really improve the implementation process, we should address the complexity of the reality and make at least two changes to the academic and practical agendas.

The first is to stop seeing the implementation process as a linear development and accept its dynamic, difficult, and contradictory character. The second is a shift from the technology-driven approach towards a human-driven, or social, approach to IT implementation. This notion results in the third focus of our research: we will consider the implementation process as a social development, with a dynamic and complex reality.

1.4 A LEARNING APPROACH TO GROUPWARE IMPLEMENTATION: INITIAL INTRODUCTION

In our research, we attempt to theorise a multifaceted complex IT implementation reality by looking at it from the learning perspective: more specifically from the perspective of group learning. We would like to repeat our understanding of modern information technologies–most of them are introduced to groups of employees, and can to some extent be referred to as *groupware*. Almost all modern technologies have networked, or collaborative, fragments, and human beings communicate with *one another* while using IT. That brought the third focus into the research–we call it the group essence of IT implementation.

The group essence in IT implementation reflects that groups are developing a common understanding of the technology they are forced to (or want to) use, through negotiation processes amongst themselves. In turn, these negotiation processes are a direct effect of the complex working lives that employees perceive when a new system is being introduced for performing their job tasks. Therefore, groupware implementation involves complex group processes among networked employees. This is why we see it as important to build up a conceptual view on the role of group processes in IT implementation.

Some aspects of group processes have been discussed in the IT implementation literature, such as: reflective group processes (Tucker et al., 2001; Hettinga 2002; Schippers, 2003); sharing understanding (Mulder et al., 2002); collaborative knowledge building (Stahl, 2000).

Also, the importance of several of the aspects of learning within collaborative settings has been seen in IT studies:

- Changes in technology may lead to changes in various aspects of professional competency such as knowledge, skills, and attitudes. This, in turn, can influence the ongoing use of the system. Hence, in theory, there is an ongoing process of professional and technological development which is referred to as a learning process by Neilson (1997).
- User groups adapt to a novel way of working when a new technology is introduced. Adaptive structuration theory has shown that not all groups do this in the same manner, and the adoption process, called 'appropriation', depends on the group processes and the way people interact with each other (DeSanctis and Poole, 1994; Ruel, 2001; Hettinga, 2002).
- In the 'extended version' of the structurational perspective, Orlikowski (2000) proposes looking at "communication, mutual coordination, and storytelling" as important sources for engagement with the system (p.411).
- In several case studies, the implementation process did not take place in an optimal way, and the cause of this has been attributed to a lack of reflective restructuring among the users (Tucker et al., 2001; Hettinga and Schippers, 2001).

Although some 'feeling' for the topic now exists, and recent research has emphasised the importance of certain elements of group learning for IT implementation, systematic insights are still lacking.

In this thesis, we propose a new view on the implementation of groupware; one that considers the group learning processes as the core factor in 'getting used' to a

new system. We understand group learning in IT implementation as interactional processes among employees, aimed at improving the implementation of a new system. The users practice with the system and discuss their experiences, they experiment and search for new possibilities and communicate about this, they ask for help, they clarify difficulties, they talk about errors they find while working with it, they propose new actions to improve its use and plan further implementation, they develop common rules to work with the system, they evaluate its use at different stages, and they sometimes reject it. Now we offer a preliminary definition of group learning in groupware implementation.

Group learning in groupware implementation is defined as all the interactional processes through which group members develop their understandings about a newly introduced system, and that help them in implementing it.

1.5 THE RATIONALE BEHIND THE RESEARCH

This project was conducted within the research programme BITE 2000 (Business Information Technology Engineering beyond 2000) of the University of Twente. The purpose of this programme, initiated in 1999, was to strenghten the university's interdisciplinary research in the area of business information systems, in particular the cooperation between the faculties of Computer Science and Technology & Management. The programme comprised four projects on different themes, but each with the aim to look for synergy between the involved discipline. Each project should result in two Ph.D. studies, one in computer science and one in management science.

Our study was part of the research project devoted to Evolutionary Implementation of Groupware. It was carried out by two researchers from the chairs of (1) Human Resource Management, and (2) Information Systems. The purpose of such collaboration was to follow the interdisciplinary nature of the IT implementation process, and therefore to look at it from the social and technical perspectives. The social investigation focused primarily on observations of the interactional group processes (Bondarouk and Sikkel, 2003), and the technical investigation more on the analysis of the requirements of IT, its structure, and an analysis of its usage (Pumareja et al., 2003).

Our study is rooted in the research traditions of the HRM department of the Twente University that focus on the interaction between innovation in work and organisation and other types of innovation (such as product and process innovations) (cf. Looise, 1996). Various studies conducted in the department have contributed to the departure point for our research:

- The influence of societal and cultural changes on the position and functioning of employees, which are seen as fundamental issues with respect to the HRM aspects of innovation (Looise, 2001).
- Research on team (i.e. group) working and leadership has indicated that groups provide better opportunities than do individuals in terms of both idea generation and in responding flexibly in developing solutions, and therefore support innovation better (De Leede, 1997; Stoker, 1998).
- Research on labour flexibility has shown that Dutch employment relationships show a trend towards radical decentralisation leading to the individualisation of such areas as types of labour contract, working time

arrangements, reward systems, and development plans (Looise and Van Riemsdijk, 1998; Van Riemsdijk and De Leede, 2001; Torka, 2003).

- In most cases, innovations are considered to be the result of cooperation between individuals, disciplines, and departments. Hence, extensive communication and participation is a precondition for achieving the required results (De Leede, 1997; Drucker, 2003).
- As the lifetimes of occupations and functions offered by organisations have shortened in recent decades, the mastery of learning and coping strategies, has become an important topic in research on employability. It has been shown that paying close attention to an individual's learning value is indispensable if one is to guide the development of professional growth throughout a career and enable lifelong development of professional expertise (Van der Heijden, 1998; Van der Heijden and Brinkman, 2001).
- The research on the 'human side' of information technologies has shown the importance of user involvement in implementing IT and teleworking as these amount to an organisational change (Ruël, 2001; Limburg, 2002).

Furthermore, within the Faculty's research, the debate on the social aspects of IT implementation has enriched our study. Research on ERP implementation has shown that the introduction of ERP in organisations involves changes in human capabilities, social relationships, structures, and behaviour; and therefore should be considered as an organisational change (Katsma and Muntslag, 2003). Constructive organisational learning is considered to be an enabler of successful ERP implementation (Muntslag, 2001). Several studies have focused on the power relationships, conflicts, and structural contradictions within IT implementations (as examples: in the Dutch hospitals context, Fehse, 2001; in the healthcare context, Schuring and Spil, 2002; within Dutch Ministries, Ehrenhard et al., 2004).

Inspired, initiated, and motivated by the aforementioned research directions, our project contributes to the research in the field of the social aspects of IT implementation.

We strongly believe that it is not the quality of the technology, and not even that of the individual users, but rather the interaction between the users that influences the success of a newly introduced information system. Although we recognise the importance of the factors contributing to the success of IT implementation that were identified in the traditional IT studies, we propose that there is another, more important, factor that intervenes in the success of groupware implementation–the interaction processes between the users, which can be called group learning. Therefore, our research is focused in three ways:

- On one type of IT–we are only considering groupware technologies that are traditional groupware systems or embedded collaborative fragments as parts of more-general applications. It is important that such software provides technical support for collaboration.
- On IT implementation processes–initially defined as the use of a new IT by the targeted employees *after* the technical introduction of a system.
- On *Group Learning*–based on the *group* essence of *groupware* implementation, and defined as all the interaction processes between the networked users through which they develop their understanding of the system and its implementation.

The goal of this research is to build a theoretical understanding of IT implementation through group learning. We aim to reach an understanding of how

people constitute their work with a newly introduced information technology. We want to conceptualise how IT implementation develops through group learning processes.

Our main research question is thus formulated as: *What is the role of group learning in the implementation of groupware by groups of users from its technical installation until its successful use?*

This question can be put alongside the 'first round' research model shown in Figure 1.1.

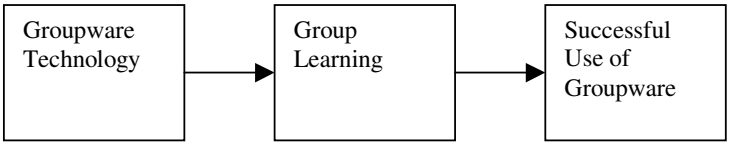


Figure 1.1. Initial research model -1

To begin to answer the research question we can look at the existing literature in order to decipher the boxes in research model–1 and develop a preliminary model of IT implementation through group learning. We will also expand on the central research question. Following this, we will develop a research method that should hopefully: be different to the traditional ones, provide a powerful mode that uncovers the dynamics of IT implementation, and provide us with the opportunity to conceptualise assumptions by the users about IT implementation.

Following this, we will continue to build theory through the use of case studies in order to combine everything into one overall view. Conducting case studies in this research is aimed at: refining our initial understanding of IT implementation through group learning, comprehending group learning characteristics better, and modelling all the developed constructs.

1.6 OUTLINE OF THE THESIS

Figure 1.2 shows that following this introduction, the next chapter develops the theoretical background of the study, resulting in a preliminary research model. Then, in Chapter 3, we elaborate on the research methodology. The next three chapters report on the case studies on IT implementation: a personnel management IT in a hospital (Chapter 4), a knowledge management IT in an insurance company (Chapter 5), and a further personnel management IT in a university (Chapter 6). In each case, we apply the research model and explore the role of group learning in IT implementation. Finally, we reflect upon the findings in the three case studies, theory and the methodology to draw conclusions and answer our research questions (Chapter 7).

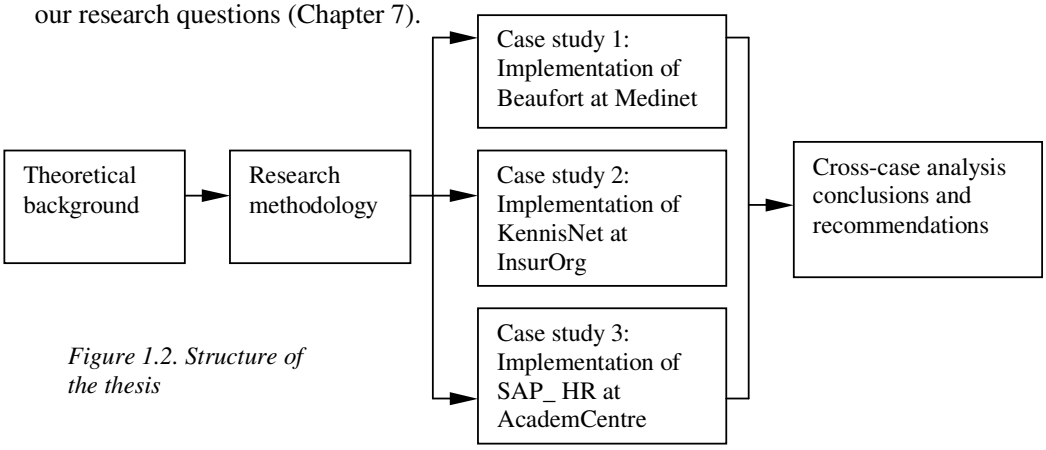


Figure 1.2. Structure of the thesis

2. THEORETICAL FRAMEWORK: GROUP LEARNING IN GROUPWARE IMPLEMENTATION

"We know why IT projects fail, we know how to prevent their failure–so why do they still fail?"

Standish Group International (Chaos Report, 2001)

How does group learning guide the implementation of IT? This is the central question for our research. In introducing a new information technology to a group of employees, they are being asked to learn. The employees begin to learn together how to use a system by asking questions, sharing experiences, clarifying difficulties, and discussing mistakes. By paying attention to how they learn from their experiences, we can move the implementation process forward from a rational step-based procedure towards a dynamic user-oriented development. However, much remains to be understood about this complex phenomenon–especially on how to operationalise group learning in IT implementation.

The main objective of this chapter is to conceptualise group learning for the implementation of technology. In the introductory chapter, we specified three focus points in the research. The first focus of our research is on a specific type of ICT: we are considering groupware systems that are, in our view, collaborative software packages and fragments (traditional or embedded in more complex systems) that enable collaboration among users. The second focus is that we are concentrating on the implementation of a newly introduced information technology as a process that starts only after a system is introduced to the users. We will not look at the preparatory phases such as designing, piloting, and prototyping although we recognise their importance. The third research focus concerns the social aspects of the implementation process. We will not consider technical matters in the implementation of IT, but focus on the human issues and, more specifically, on the interaction processes between the users that we label as group learning.

Therefore, the first step is to search the literature in order to provide an overview of groupware characteristics with special attention to those that are relevant for our study (Section 2.1). Then we will discuss IT implementation. Our theoretical discussion will be based on the debates between two polar approaches to IT implementation: soft and hard. After describing these, we will emphasise our research position (Section 2.2).

The roles of group essence and group learning in IT implementation are elaborated in Section 2.3. We will clarify our understanding of group learning in IT implementation by addressing group learning and experiential learning (Section 2.4). Following this, we will define 'IT implementation as group learning' (Section 2.5).

Group learning is not an isolated process and, in its most robust form, it may be interrelated with many social and technical issues in an organisation. However, we cannot investigate all of them and, in order to operationalise our research, we will

limit ourselves to what we see as the most important 'contextual environment' for IT implementation (Section 2.6). This includes the characteristics of groups of users and managerial support issues. We will make a further selection and describe only the most prominent components within them. In so doing we will come closer to developing a preliminary research model that will show us the 'blocks' of constructs and help to specify the overall research question (Section 2.7).

2.1 CHARACTERISTICS OF GROUPWARE

In this section we will discuss technology that is 'about to be used' by employees.

In the following subsections we will first elaborate on a conceptual model of groupware and show that this includes the intended goals of a system (which are usually mixed with the promised benefits) and technological functionalities (services offered by a system). To discuss the extent to which a groupware system can support collaboration, we will also introduce our classification of groupware technologies based on task interdependence criteria.

2.1.1 A conceptual model of groupware

This section first takes a sceptical look at the claims made for groupware and then goes on to create a conceptual model of groupware that should help clarify the technology construct in our research model.

Promised benefits of groupware technologies

Companies increasingly try to use groupware in an attempt to gain strategic profits and achieve the various promises made for this type of technology. These claimed benefits are usually transferred to the intended goals of a system for a company (Ruel, 2001; Fehse, 2002). Let us outline some of them.

Firstly, it is regularly claimed that groupware facilitates communication among the employees who are using the groupware tools. Communication is promised to become richer, easier, and more frequent. However, the reality is that although communication, in whatever form, can be helpful, it can also be a distraction or even be unhelpful (Mark and Wulf, 1999). This has been already recognised in the 'e-mail world'. The fact is that good work often demands freedom from interruption, and that teamwork is sometimes enhanced by less communication rather than more. So, far from enhanced message-passing being a positive feature of groupware, it may produce unwanted results (Dale, 1994).

Secondly, groupware is supposed to give better support to managing certain activities such as file exchange, project leading, and document retrieval. Groupware is also believed to provide better coordination between personnel, and this is indeed considered as one of its most beneficial advantages. Better and quicker decision-making is seen as the crucial benefit in adopting a groupware system. With quicker

response times and problem-solving information on ideas, questions, and comments presented by other employees, a company's productivity could certainly be improved (Ellis and Wainer, 1994). Finally, by extensive sharing of resources and data, groupware will decrease individual and unnecessary hardware and software needs (Yen et al., 1999).

As we have said, these promised advantages, or possible benefits, ascribed to the use of an information system often become the main forces behind the introduction of a technology in a company. In our research, we formulate this as *the role of the system.*

Downsides of groupware

Groupware's popularity has been dampened by several setbacks. We have stated our belief that social issues play an important role in the implementation of information technologies. We will not repeat what has been already said in the introductory chapter, but we want to now specify some social drawbacks that are typical with collaborative technologies.

Dale (1994) posed a crucial question: how, in the individualistic culture of the West, can collaboration be fostered? This question can be looked at by examining one of the problems provoked by individualism–the difficulty in getting people to give up their tendency of keeping what they know to themselves when the company would benefit from having it shared.

The fact is that this happens in all sorts of organisations. We believe that there is one essential reason for keeping knowledge and experience to oneself. Employees are valued, promoted, or even just kept in employment because of what they know, and often because of what they alone know or can do. Thus, in facing groupware introduction, people might well feel threatened.

Khoshafian and Buckiewicz (1995) determined another drawback labelled "human pride": the need to be appreciated, heard, understood; to get satisfaction; and to earn proper credit. All of these are possible obstacles that could slow the implementation of a system, or even cause it to fail.

Overall, groupware can bring many advantages to a company, but it may also stimulate problems caused by the implied request to collaborate.

Functional characteristics of groupware

What are the conceptual properties of groupware in general? If we apply an end-user vocabulary, we would reformulate this question as: what are the functionalities of the system that they want/need/or have to work with–and how are users supposed to work with those functionalities?

Such conceptual characteristics are comprised of three key elements, or models (Ellis and Wainer, 1994):

1. the ontological model–a description of the objects, and the operations on these objects that are available to users;

2. the coordination model–a description of the dynamic aspects of the system (the control and data flow);
3. the user interface model–a description of the interface between the system and the users, and among the users.

In practice, the concept of an ontological model is not limited to groupware systems: all interactive systems (whether they are single-user or group-oriented) represent some form of ontological model (Ellis and Wainer, 1994). For example, if we consider two drawing tools: one may offer objects such as straight lines, points, curved lines, closed regions; while another will offer other objects such as transistors, resistors, terminals, and crossings (Neuwirth et al., 1990). The main elements of an ontological model are objects and operations. Objects are the data structures upon which all users operate. These operations on objects are an important aspect of a user's contribution to the work.

The coordination model describes the activities that each user may perform, and how these activities are coordinated so that a group can accomplish the job. Activities seem to be considered as a potential set of operations that an actor, playing a particular role, can perform with a defined goal. An actor may be a single user or a group of users (Kuuti and Arvonen, 1992). An important aspect of the coordination model is the temporal priority given to the activities. Some activities can only start after others have been completed. Some activities may always be active at the same time, others not. For example, in a workflow system, a user may require all billing and shipping address information to be entered in a client order form before the client's credit can be evaluated. In this situation, the system may allow the data to be entered in any order, without any preference whatsoever (Dourish et al., 1996).

The user interface model for groupware reflects a representation of human-human interaction, and differs significantly from single-user interface models (Bullen and Bennett, 1990; Ellis and Wainer, 1994; Yen et al., 1999). It reflects a change in emphasis from using the computer to solve problems to using the computer to support collaboration among users.

In our research model, the conceptual properties of groupware will be labelled as the *specification of the system*.

In summarising the conceptual model of groupware systems, we would emphasise that we will focus on two aspects: the role of technology in an organisation, and the specification of the functionalities of the system. Three aspects of the functionalities will be taken into account: the description of the "objects" and their handling as provided by the system to the users, the description of how the activities of each user should be organised and coordinated, and the ways in which the users are to interact with the system and with each other.

2.1.2 Classification of groupware systems based on task interdependence

In this section, we introduce our views on the typology of groupware facilities as depicted in Figure 2.1. Three types of groupware (Figures 2.1 a,b,d) are based on the three task interdependencies described by Thompson (1967). However, we expand on

Thompson's typology and consider a more gradual division of the link between groupware facilities and task interdependence (Figure 2.1 c,e).

Mediating groupware–pooled interdependence

Here, every user makes inputs to the system and is expected to use its outputs. There is no need for interaction between the employees over the system because they work independently. Their tasks can be identical or different, but they all need the system to perform their tasks.

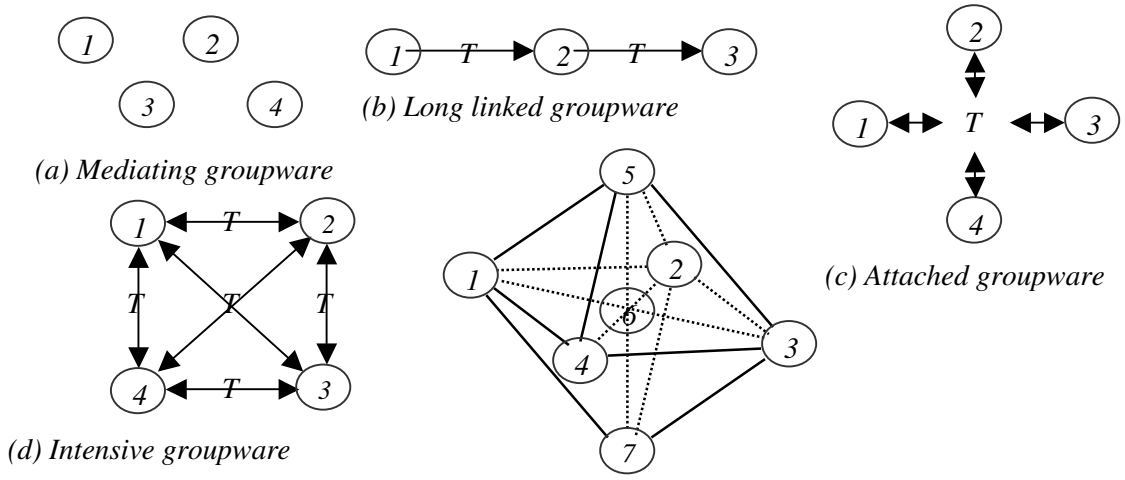


Figure 2.1. Types of groupware technologies based on task interdependence

The interdependence exists only in the sense that they are using the same software platform that has specific properties and rules for all its users and builds a certain information and communication atmosphere (Figure 2.1a). A group of users is referred to as an organisational unit (department, division, or the whole company) with the same information and communication space.

We can call such an IT a groupware system only in the sense that the employees have a 'group understanding' of it and develop a certain common image about the system during its use. Interdependence occurs when the working unit has to adopt a new platform (provider), or a new version of the current platform. The success of the implementation process is the success of the whole unit as a group.

Long linked groupware–sequential interdependence

All tasks have to be performed in a set sequence (figure 2.1b). Employee 2 will start to make input only after employee 1 completes their tasks. A direct interaction exists between 'neighbouring' employees.

While every user may make a similar magnitude of inputs to the system, the amount of output varies: while user 2 has access only to the inputs from user 1, someone with access to the final step can make use of the total information concerning the end product. Most groupware products have technical fragments that support sequential interdependence.

Attached groupware–balanced interdependence

Most of the time, employees work individually with the technology and make inputs and deliver outputs (Figure 2.1c). There is little direct interaction between the employees, but they are interdependent in the sense that every incorrect contribution to the system may create problems for others. Task performance does not necessitate regular and frequent interactions, but they do occur occasionally when there is a need to share information. Typical examples of this type of groupware products are Team Room and document sharing systems.

Intensive groupware–reciprocal interdependence

Every employee makes inputs to the system. There is a need for an intensive exchange of inputs and outputs. In order to produce the end product, there is strong and direct interaction between the employees, and they are interdependent on their inputs into the groupware. The output of each participant becomes the input for others. Any incorrect contribution to the system creates problems for the whole group, and every productive input contributes to the improvement of the group documents (Figure 2.1d). Groups usually face this type of interdependency during e-meetings (video and audio conferencing, document editing, e-mailing) and working with Group Decision Support Systems.

Multichannel groupware–associated interdependence

One employee may be dependent on all the others through a complex intra-organisational network of data flow. It is possible that not all employees have direct interactions with each other, but their inputs to the system towards the end product may be the result of:

- pooled collaborative wheels, combined in a sequence;
- pooled collaborative wheels, incorporated in a higher wheel;
- sequential lines, combined in a pooled collaboration;
- sequential lines, incorporated in a higher sequence.

This is effectively a mixture of pooled and sequential interdependence (Figure 2.1e). It represents a complex flow of operations with the system–inputs and outputs–within

departments, divisions, and across the whole company. It occurs, for example, when employees work with modules of complex ERP systems.

This classification brings a real *group* essence to groupware implementation because it allows one to focus on the task interdependence among networked users and the extent of collaboration offered. This component will be included in our research model as *enabling collaboration*.

2.1.3 Feedback to the preliminary research model

We have considered those technological characteristics of groupware that are relevant to our research. In fact, only one of them can be viewed as a real technological feature–the functional characteristics, where we talk about the services offered by a system to the targeted users. That is labelled as the *specification of the system* and described in terms of the conceptual properties of the groupware that include the ontological model (a description of the objects and the operations on these objects that are available to users); the coordination model (a description of the dynamic aspects of the system); and the user interface model (a description of the interface between the system and the users, and amongst users). Two other aspects of the technology are not really technical: *the role of the system* in an organisation (we have noted that often the introduction of a system is forced due to the promised benefits); and *enabling collaboration* (the extent of task interdependency supported by a system). The box about Groupware in our interim research model has now been deciphered (Figure 2.2).

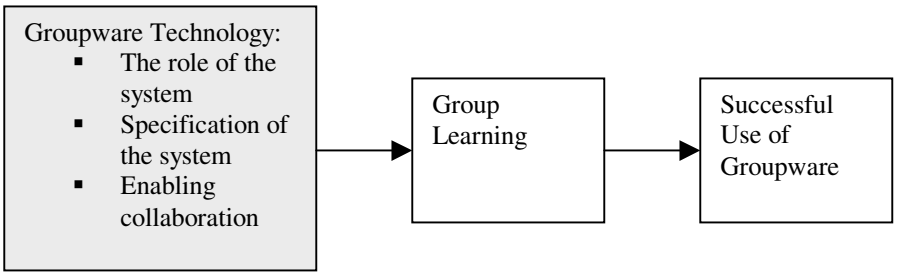


Figure 2.2. Interim research model–2: Implementation of groupware through group learning

2.2 DEFINING IT IMPLEMENTATION

At the centre of our research, attention is given to the technology implementation process. Given the numerous works on IT implementation we should clarify our understanding of it–on which aspects of IT implementation do we concentrate in this research.

Gottschalk (1999) notes that "the term implementation is given a variety of meanings in the literature" (p.80), and we would add that in many studies implementation is seen rather as an implicitly clear word (Joshi, 1991; Orlikowski and Robey, 1991;

Lederer and Salmela, 1996; Griffith, 1996; Mark and Wulf, 1999; Pipek and Wulf, 1999; Orlikowski, 2000).

Regarding the start of the implementation, we have already noted that our investigation begins when the technology is introduced to the targeted users. That is, in this study, when the implementation process begins: we do not look at the processes that occur before the introduction such as the design, prototyping, or preparation phases.

Regarding the final stage of the implementation process, various authors have different views and these are mostly implicit. In Table 2.1, the reviewed studies on implementation are classified according to how the authors view implementation to be complete. Before the implementation is complete, there must be the implementation process itself. It is probable that differences in the understanding of the completion stage of IT implementation are the result of the different theoretical (and methodological) underpinnings, and so we will look at these first.

Implementation is complete when …	Study
A new system (or some changes in the system) is technically installed.	Lucas, 1981; Nutt, 1986
The system is accepted by users.	Baronas and Louis, 1988; Davis, 1989; Alavi and Joachimsthaler, 1992; Lou and Scamell, 1996; Karahanna and Straub, 1998; Segars and Grover, 1993; Venkatesh, 2000; Brown et al., 2002
The system is appropriated.	Leonard-Barton and Deschamps, 1988; Orlikowski, 1992; 1993; DeSanctis and Poole, 1994; Volkoff, 1999; Ruel, 2001; Hettinga, 2002
Satisfaction with the system is achieved.	Griffith, 1996; Klein and Sorra, 1996; Schuring and Spil, 2002
Intended objectives are met.	Lederer and Salmela, 1996
The system is antiquated and there is a need for replacing the system or for a major change in it.	Sanderson, 1992; Pipek and Wulf, 1999

Table 2.1. Stages at which implementation is complete (adapted from Gottschalk, 1999)

Over time, various research theories on IT implementation have been developed as a result of combining a range of theoretical perspectives on technology and organisations. It is not our purpose to describe them all, and elaborated overviews are available in the literature. Just as examples, we can mention:

- Media Richness Theory (Daft and Lengel, 1986; Suh, 1999),
- User Interface Design (Mayhew, 1992),
- Socio-Technical Systems Theory (overview by Mumford, 1999),
- Technology Acceptance Model (Davis, 1989; Venkantesh, 2000),
- Contingency Theory translated to IT research (Gutek, 1990; Bell and Johnson, 1996),
- Coordination Theory (Malone and Crowston, 1990; Crowston, 1997),

- Activity Theory (Nardi, 1996; Vikkunen and Kuutti, 2000),
- Network Analysis (Barley, 1990; Burkhardt and Brass, 1990; Rice and Aydin, 1991),
- Actor-Network Theory (Callon, 1987; Latour, 1991; Law, 1991; Woolgar, 1991),
- Improvisation Theory (Ciborra, 1999), and
- Structurational models (DeSanctis and Poole, 1994; Jones, 1999; Orlikowski, 2000).

We need to relate the range of diverse IT studies in order to better understand our own perspective. To do this we will categorise IT approaches along two theoretical dimensions. The first dimension tackles the relative importance of a prescriptive versus an enacted implementation. The second dimension concerns the extent to which a technology is understood as a 'touchable' physical system versus a mental framework. These two dimensions shape two opposing approaches to IT implementation: hard and soft.

As an attempt at a more precise definition we can say that the hard and soft approaches in IT implementation are distinguished by:

- whether an implementation process is prescribed as against being enacted during use of the system,
- whether an information technology is considered as a given physical 'body', or as a social construct, i.e. a matter of mental frames and structures (Gasson and Holland, 1996; Currie and Galliers, 1999).

In the following sections we present the theoretical debates and the features of the hard and soft approaches used in IT studies (Sections 2.2.1 and 2.2.2), and then we will explain the understanding of IT implementation as used in our research (Section 2.2.3).

2.2.1 The 'hard' approach to IT implementation

In reviewing the literature, it would appear that the early (pre-1990) work was dominated by the *hard* approach to the implementation of IT, concentrating on the role of the technology and the technical aspects of its implementation. This approach offered concrete linear-based solutions for IT-related problems (systems design, user resistance issues). Due to its long history, the hard approach still has a strong influence on IT research. It appears under different labels: traditional IT studies, factor-based studies, consultancy-based research, and even pre-methodological IT research (Currie and Galliers, 1999; Avison and Fitzerald, 1999).

According to Gasson and Holland (1996), those adopting this approach view technology as a given material substance with 'touchable' technical properties and services that have to be used by the targeted employees. The IT implementation is well defined as a step-based development, directed at achieving organisational goals and user satisfaction. It tends to offer a panacea to organisations that are striving to implement a new system. Examples of practical solutions include special tactics for IT project management, alignment with the organisational strategy and culture, and human-computer interaction aspects.

We share the common criticism that the hard approach can only partly clarify what really constitutes the implementation process since it does not pay sufficient attention to the dynamic interactional reality of the process of implementation.

However we would attribute to such studies the awareness of different technical, organisational, social, and human 'issues', and their importance for IT success. We propose to review these studies on the basis of these 'issues', rather than describing separate concepts and theories.

First of all, as we have remarked in the introduction, we leave to one side–although they are very important–the technical aspects, and instead focus on the non-technical concerns of IT implementation, known as the 'social issues'. What factors have been explored that influence the journey from the introduction of IT to its use in companies and are considered to be factors of the system's failure or success?

It is almost thirty years (1975) since Henry Lucas wrote a classic book in which he stated: "The primary cause for systems' failure has been organisational behaviour problems". There is much recent evidence that suggests that non-technical issues have become even more important and critical to the successful implementation of IT (Ahn and Skudlark, 1997). The main issues can be divided into:

- organisational issues (alignment of IT strategies with organisational strategies, structure, power distribution, and politics and culture);
- managerial issues (leading IT projects: end-user participation, education and training, availability of support resources, etc.);
- 'human' issues (psychological aspects, appropriation, acceptance, behavioural intention).

In this overview, we first outline the core tendencies in the traditional IT studies and the solutions they offer to avoid IT failure. Secondly, we will show the limitations of these studies that tend to have a static view of IT implementation.

Organisational issues of IT projects

Studies in this strand of the literature focus on the issues surrounding IT alignment in organisations. This is conceptualised as a mutual adaptation between the technology and the organisation. According to the work of Doherty and King (1998), organisation and IT alignment can be classified by three main sub-themes:

- the link with the organisational strategy and structure,
- organisational culture, and
- the distribution of power.

A mismatch in the alignment is assumed to result in IT failure. Overall, therefore, these studies aim at developing factors that might lead to a better IT alignment. In the discussion on strategic alignment, researchers often refer to the model of Henderson and Venkatraman (1993) that identifies four domains in strategic choice: (1) business strategy, (2) IT strategy, (3) organisational infrastructure, and (4) IT infrastructure. The authors argue that this means that companies need to manage the fit between strategy and structure, as well as the fit between the business and IT. Hussin et al. (2002) argue that researchers tend to focus only on parts of that model. Indeed, Chan

et al. (1997) focused on the link between business strategy and IT strategy, while Raymond et al. (1995) concentrated on the relationship between organisational structure and IT structure. Bergeron et al. (2001), in comparison, have included environmental uncertainty in exploring the links between all four aspects and business performance.

More recently, Hussin et al. (2002) have applied IT alignment factors to small firms and found that the main factors for IT strategic alignment within small firms were IT sophistication, IT maturity, and the CEO's commitment (but not necessarily personal involvement) to IT. They conclude, firstly, that there is no easy route to IT alignment (for example by appointing an IT specialist) and, secondly, that it is important for companies to learn from their use of IT so that opportunities can be recognised and priority given to supportive IT initiatives (p.119).

The relationship between IT and culture is explored in the question as to whether organisational culture lays down guidelines for the usage of IT (Claver et al., 2001). Several authors supply a positive answer to this question (Poole and DeSanctis, 1992; Brown and Starkey, 1994; Allard, 1998; Katz and Townsend, 2000). The basis for such an opinion is that if the members of an organisation share the view that IT results in better performance and competitive advantages for a firm, then its usage will become part of the firm's values. In this sense, Lu (1995) has pointed out that the introduction of IT will meet less opposition if the existing culture emphasises innovation and decision-making in risky environments.

In considering the ethical issues of IT implementation, Cooper (1994) has suggested that, in change programmes, both sides should take part: those who are in charge of organising the change and those who must undergo such programmes. However, if the cultural values are against the IT implementation, authors argue that a cultural change will be required for the new shared beliefs to be accepted, and that this will only take place over a long period, whereas in most practices the IT must be implemented in the short term. The overall conclusion in 'cultural' studies is that culture should not be ignored when implementing an IT, and that, therefore, there are many conditions that must be met or developed (Claver et al., 2001).

Another stream within this field describes the introduction of information technology by using a political metaphor (Bloomfield et al., 1992; Dawson et al., 2000; McLoughlin et al., 2000; Badham et al., 2001; Fehse, 2002). These authors state that most decisions in the implementation process are ultimately political, as they involve complex decisions with uncertain outcomes, actors with conflicting views, and are ultimately often resolved through the exercise of power (Badham et al., 2001). Organising the implementation process, therefore, requires the mobilisation of power resources through political activity (McLoughlin et al., 2000). In their study on the development of management information systems in three British hospitals, Bloomfield et al. (1992) conclude that the impact of technology can be considered only as a "negotiated" treaty amongst the various stakeholders. Continuing this theme, Fehse (2002) proposes that stakeholders with high goal impacts are most likely to display active political behaviour aimed at goal achievement (influencing, forming alliances, engaging); which she then contrasts to politically passive tactics that prevent the pursuit of project goals (avoiding conflict, image building, scapegoating).

All studies in this sub-stream explain how decision- and non-decision- making activities, that reflect political processes, contribute to the technological changes and implementation outcomes (Dawson et al., 2000). At the same time, it is acknowledged that "the most powerful stakeholder group gets what they want without a great deal of effort in terms of political behaviour. Instead their level of influence is accepted by the stakeholders who don't want to challenge the existing power distribution" (Fehse, p. 224). Such a conclusion clearly casts doubts on what if anything can be improved in the organisational political arena during the implementation itself.

To summarise, we have shown that various authors emphasise the importance of organisational issues in IT implementation and argue that a better fit between IT strategy and the organisation (business strategy, structure, culture, political processes) has advantages, and that it is recognised that such a fit requires many organisational modifications (structural, cultural or political).

Managerial issues in IT projects

The studies of managerial issues in IT projects suggest activities and practices that are, to some extent, similar to those in the change management research. Countless case studies of IT implementation give detailed descriptions of practices that might ensure success in IT projects, for example: (a) job reassignment or job elimination (Klein et al., 2001); (b) the provision of technical assistance to the users on a just-in-time basis (Rivard, 1987; Tan, 1996; Meyers et al., 1999); (c) rewards such as promotions, praise from supervisors, improved working conditions (Rousseau, 1989; Klein et al., 1990); (d) effective communication regarding the reasons for an IT introduction (Pinto, 1998; Cooper, 1999; Ruel, 2001); (e) the provision of time for users to experiment with new IT (Zuboff, 1988; Martinez, 1994). In addition, much attention is given to the quality and quantity of the efforts to train employees in the use of a new system (Fleischer et al., 1987; Klein and Ralls, 1997). It is argued that ignoring these issues might result in the failure of a project.

There is a special, in our view, IT research sub-stream within this flow: exploring the possibilities and ways for user participation and involvement in IT projects. Beginning in the 1970s, the research community began to consider user participation to be critical for the success of IT implementation. Since then, researchers have studied user participation, convinced of its influence on the use of information technologies (Ives and Olson, 1984; Doll and Torkzadeh, 1990; Barki and Hartwick, 1994). In IT, user participation is usually referred to as activities and behaviours performed by potential users during the development or implementation of IT. Such studies are primarily focused on determining the dimensions and indicators of user participation. For example, Baroudi et al. (1986) identified 47 development activities, 20 general activities, and 27 activities that occur in one of the three stages of the development life cycle–system definition, system design, and system implementation. Examples of such activities include project initiation, determining system objectives and user IT needs, and developing input and output forms. These activities were later used in conducting studies linking participation to user satisfaction.

Barki and Hartwick (1994) suggest three other dimensions for user participation: overall responsibility, the user-IT relationship, and hands-on activities. Overall responsibility refers to users' activities that reflect overall leadership in the system development. Examples include being the leader of the project team, being responsible for selecting hardware or software, estimating costs, and requesting funds. The user-IT relationship refers to development activities reflecting user-IT communication and influence such as the initial evaluation and approval of a formal agreement of work to be done by IT staff, being kept informed during the stages of the system's development, and the evaluation of work done by the IT staff. Hands-on activities refer to specific physical implementation tasks performed by the users, such as defining screen design and report formats, creating a manual, and designing a user training programme. It was found that the overall responsibility played a key role in IT implementation.

Following a review of the construct of involvement in psychology, Barki and Hartwick (1994) made a strict distinction between the concepts of user participation and user involvement in IT implementation. User involvement is defined as a subjective psychological state reflecting the importance and personal relevancy of the IT project. It refers to a belief–the extent to which a user believes that a new system is both important and personally relevant. As such, user involvement is likely to be related to, but distinct from, other subjective psychological states such as user attitude which are defined by affective or evaluative judgments.

Overall, the literature on what we have termed 'managerial issues' offers various solutions to bring 'high level' or 'sophisticated' IT strategies and purposes across to the individual users. These solutions, including user participation and traditional project-leadership practices, may well influence the users' attitudes and behaviours towards the launched system, and thus influence positively the actual use of the system.

'Human' issues in IT projects

The 'human' issues in IT projects refer mostly to the individual user aspects of using an IT. Studies suggest that ignoring or misunderstanding these aspects leads to strong resistance in IT projects and possible failure.

Within this strand of the literature, the sub-stream of human-computer interaction (HCI) is mostly concerned with improving the usability of a system by supporting the interactions between humans and computers (Carroll, 1997). It is argued that the discrepancy between the structure of information processing by human beings and information technologies leads to project failures. The literature again offers countless solutions that are mostly a combination of applied psychology and computer science research (Davis et al., 1989; Joshi, 1991; Adams et al., 1992; Morris and Venkatesh, 2000; Venkantesh, 2000; Brown et al., 2002; Taylor, 2004).

Accepting that there are individual differences in cognitive style, it is shown that such differences have significant implications for IT use. For example, it is argued that analytical thinkers are more willing in general to use information systems (Lucas, 1975; Snitkin and King, 1986), and especially those systems that contain quantitative

models and mathematical techniques (Lusk, 1973; Benbasat and Taylor, 1978; Lu et al., 2001). In terms of the preferred methods of communication, analytics choose electronic media, while intuitives favour face-to-face methods (Barkhi, 2002). Cognitive styles are associated with seniority, and senior managers tend to favour the more intuitive cognitive styles (Allison and Hayes, 2000), and therefore the usage by managers of information systems is likely to be low. A recent study by Taylor (2004) has extended the debate about the effects of cognitive styles and individual differences on usage of knowledge management systems. The main results of his study are that, firstly, cognitive style has an impact on the usage of a knowledge management system and, secondly, gender significantly affects the usage of knowledge management (KM) technologies, with males being more likely to use such systems than females (pp. 57 – 58).

The Technology Acceptance Model (TAM) developed by Fred Davis in 1989 states that users will accept a system if it has a significant perceived usefulness and ease of use. People tend to use (or not) an application to the extent that they believe it will help them perform their job better (perceived usefulness). Further, even if people believe that a given application is useful, they may believe that the systems are too hard to work with and that the performance benefits of usage are outweighed by the efforts required using the application (ease-of-use). It was shown that usefulness is more strongly linked to actual system use than ease-of-use. The dominance of usefulness over ease-of-use has important implications for the designers and those responsible for implementation. Across the many empirical tests of TAM, perceived usefulness has consistently been a strong determinant of the usage intentions of employees. As of January 2000, the Institute for Scientific Information's *Social Science Citation Index*® listed no less than 424 journal citations to the article by Davis (1989). Within a decade, the TAM concept had been enriched by elaborating on various determinants of the perceived usefulness and ease-of-use.

Adams et al. (1992) suggested that the correlations discovered by Davis (1989) are more relevant to the optional and less so to the mandatory use of IT. Taylor and Todd (1995) bring across the importance of the users' software experience: ease-of-use is strongly correlated with experienced users, while usefulness is strongly correlated with non-experienced users. Karahanna and Straub (1998) argue that social presence and the availability of training support both promote the ease-of-use and the usage itself. Venkantesh (2000) validates the view that ease-of-use is a function of internal and external control, intrinsic motivation, and emotions. Morris and Vekantesh (2000), investigating the influence of age, find support for the idea that system usage among young users is influenced by attitudes, and among older users by subjective norms. The study by Brown et al. (2002) explores the effect of the optional versus mandatory nature of IT use. They conclude that, in optional situations, low usefulness is correlated with low usage, and in obligatory situations that low usefulness is correlated with poor attitudes. When system use is still mandatory, the system usage among young users is influenced by attitudes and among older users by subjective norms.

On the whole, the studies of the 'human' aspects of IT implementation advance direct reasons that promote the individual usage of IT. The associated theoretical analysis

brings together a variety of perspectives, including expectancy theory, self-efficacy theory, behavioural decision theory, diffusion of innovation, and marketing.

Limitations of traditional IT studies: concluding remarks

Looking at what the traditional IT studies have found, we note that this dominant stream of work has been devoted to discovering factors and processes, i.e. 'issues', associated with the failure or success of IT.

Overall, management is supposed to rationally implement IT changes. End-users are supposed to work happily with the system towards a promised growth in organisational performance. If the users are resistant, or less happy than expected, it is because of mistakes made in the design process, the lack of shared beliefs, 'wrong' age and 'wrong' subjective norms, insufficient software experience, or lack of support in training. Disgruntled human interactions with the technology can be improved by better rewards, with technical assistance, or by redesigning job tasks. The implementation is therefore seen as a rational process, with predictable and analysable difficulties that can be avoided if the IT project is managed well.

The hard approach has many attractive features that explain its wide adoption: it elicits key dimensions of failure situations across organisational settings; it is straightforward to replicate and validate; and it is easy to develop prescriptions from it. It is based on a practical situation in which organisations have to adopt a system as a physical substance.

Although we recognise the importance and convenience of many of the explanations and solutions offered by traditional IT research, we cannot help but notice that, although they have now existed for more than 30 years, the problem is still there: the implementation of IT is not as straightforward or as successful as predicted.

We will now discuss some of the limitations of the traditional studies on the social issues of IT implementation.

Firstly, many of the prescriptions are still insufficiently specific to be followed in practice. For example, Sauer (1999) notes that the collection of user requirements has long been prescribed, and that almost every IT project can claim to respect this prescription to some extent, but that there are no adequate guidelines about what constitutes an adequate collection. Only during the post-implementation phase, when it is too late, is such analysis performed. If prescriptions can be, and are, easily followed (for example, clear IT objectives are often described), then a drawback in another dimension (such as a lack of structural alignment) can still prevent the IT project achieving success. Some prescriptions are not easy to apply. For example, what should a project team do in order to get high commitment from top management to their project?

Secondly, traditional IT research has been constrained by its choices of scope in its studies. While findings present a single phenomenon in IT implementation, it is acknowledged that this process includes a set of diverse phenomena.

Thirdly, although some researchers do acknowledge the importance of the more dynamic aspects of IT adoption, they still discuss implementation as logical,

sequential, and detailed processes, executed by those responsible. This, of course, does not reflect the reality of IT implementation in organisations: these are contradictory processes, full of delays, infrastructural difficulties, misunderstandings, shortage of resources, or limited user involvement.

Next, there is also a tendency in the more traditional IT studies to view the context as a static and stable entity, and so assume that it can be measured in cross-case studies of IT implementation in organisations. As a result they fail to investigate the reciprocal interaction between context and use of technology, wherein social context affects and is affected by the use of IT.

Fifthly, in talking about 'social' issues, traditional IT studies usually overlook the interpersonal aspects of IT implementation. In other words, they focus on human-computer interaction while forgetting about 'human-human' communications during the implementation of technology.

This is where our research departs from the traditional studies. We should like to remind the reader of our understanding of modern information technologies: most of them are introduced to groups of employees, and can to some extent be referred to as *groupware*. In our view, traditional IT studies do not pay adequate attention to the *group* essence of technology implementation despite, in today's networked practices, this aspect becoming ever more important. Whilst almost all modern technologies have networked, or collaborative, fragments, human beings communicate with *each other* rather than with the computer while using IT, though they might well use computers to do so.

2.2.2 The 'soft' approach to IT implementation

The post-1990s period has seen a shift towards behavioural and human aspects in IT implementation and the beginnings of a *soft* approach towards IT studies. This has largely been because of the growing interest in understanding the *management* of information systems. According to Lee (1999), the management of information technologies "begins where computer science ends" (p.7).

In contrast with the hard approach, the soft one considers the IT-related problems as ill-defined: the technology is perceived as part of a wider social and political system. The implementation is seen as an interactive, on-going process between the organisational and technological features (Gasson and Holland, 1996). Therefore, these studies address the dynamic nature of the IT implementation process and tackle many criticisms levelled at the more traditional IT research.

The technology itself is perceived as a mental frame, or social construct, rather than as a physical entity, and therefore it is seen as subject to change during the implementation process. The goal of a researcher is to understand the implementation process instead of prescribing factors of success.

Various researchers have developed their 'soft' views on IT implementation in parallel: social constructivism (Akrich, 1992; Latour, 1999); improvisation theory (Ciborra, 1999); structurational models (DeSanctis and Poole, 1994; Orlikowski, 2000); contextualism (Fulk et al., 1992); and actor-network theory (Lea et al., 1995).

Researchers into the technology have begun to use the concepts of innovation, learning, culture, context, social inscription, and improvisation to understand the ongoing changes that occur during IT implementation (Lea et al., 1995; Orlikowski, 1996; Ciborra, 1999; Robey et al., 2000; Walsham, 2002). We will discuss three 'soft' IT theories that are, in our view, clearly established, and that have been broadly debated and recognised in the scientific community: social constructivism in IT studies, structurational models, and actor-network theory.

Social Constructivism and Information Technology

Studies in this area base their ideas on developments in the sociology of scientific knowledge. In the sociology of science, it has been argued that knowledge is a social construction rather than a mirror of reality. Knowledge, therefore, is considered as susceptible to more than one interpretation (Bijker and Law, 1992). Accordingly, scientific knowledge and technologies are established in a process of social construction and negotiation. The social construction of technology considers the system not just as a purely technical product of design, but proposes that technology is grounded in, and constituted by, social forces.

A cornerstone of social constructivism is that technology reveals interpretive flexibility. It means that a system is open to more than one interpretation; it can have various implications for different individuals and groups of people. The goal of social constructivism is to follow this process and to understand how different interpretations can occur.

The design of a system is considered as done but not fixed in the traditional development stage. This is referred to as IT inscription, analysing how the ideas of designers are shaped and evolved in technological systems. An interpretive flexibility in technology means that its design continues to evolve during implementation (see, for example, Bijker, 1992). As a consequence, "the functions of new technology are negotiated during the course of its development and through adoption by the users" (Lea et al., 1995, p.464). This process can be illustrated by the case of mobile telephone technology whose early developers perceived as a medium for interpersonal verbal communication rather than for SMS messages, and as a tool of commerce rather than for social use.

Social constructivists, using case studies of technological invention and development, examine how interpretations, social interests, and disciplinary conflicts shape the production of technologies through shaping both their cultural meanings and the social interactions between relevant social groups. They seek to account for both successes and failures of technology. For example, the study by Feenberg (1992) on the implementation of the French videotext system (Télétel) has shown the 'transition' in the intention of the system during its usage. Originally designed as an information service linking French householders to online databases, Télétel was subsequently 'reinvented' during use to become a successful computer-based messaging system for interpersonal communication between users. The success of Télétel was explained in terms of the relevant social actors and the kinds of social and technical issues that were negotiated and renegotiated during its use. In this case, the functions of Télétel

followed from interpretations that were agreed upon through the negotiations among PTs, manufacturers, the press, the public, and eventually the users themselves, over issues such as the mode of connection of databases to the system, the means of providing access to the system, and the definitions of services. Technical problems and their resolutions had profound implications for relationships between the relevant social actors (Feenberg, 1992).

Social constructivists examine how the produced technologies achieve some form of 'stabilisation' through negotiation, persuasion, and debate aimed at community consensus (Akrich, 1992; Latour, 1999). However, a stable technology only emerges once solutions have been found and applied.

All this means that social constructionists challenge the deterministic analysis of the traditional IT studies by considering the social actors to be active constructors of the technology's development and use. They focus on tracing the use of technology through the construction of different meanings by pre-existing social groups such as end-users. With that, the primary concern of social constructivism is the dominant influence of existing social groups on technology development.

The following two discussed approaches–structurational models and Actor-Network theory–propose that all the actors (technology and humans) co-evolve over time in a process of translation of the technology and the social actors by each other.

Structurational Models and Information Technology

Given the increasing volume of IT research citing structurational theory, we will not attempt a complete review (an exhaustive overview is given by, for example, Jones, 1999). Instead, we will identify the main issues in structuration-based IT research.

The structurational models have posited that technology is developed through a social-political process which results in structures (rules and resources, organised as properties of systems) becoming embedded within the technology (Orlikowski, 1992). In Giddens's structuration theory itself there is very little written that can be directly related to IT implementation. There is only a reference to the role of IT in time-space distantiation, and he suggests that e-mail and video may substitute, to some extent, for face-to-face interaction in achieving social recognition (Giddens, 1984).

As Jones (1999) notes, "those seeking to 'apply' structuration theory in IT research… are very much on their own. No advice is available beyond the generalised oracular pronouncements" of structuration theory (p.117). There is a particular problem for structurational IT research in the material character of technology. This is not to say that technologies should be understood only as material substances but that all of them have at least some component of a physical evidence, even if the technology is much more that that. Structuration theory has almost nothing to say about the material substance. Giddens argues that "some forms of allocative resources as raw materials might seem to have a 'real existence'… in the sense of having time-space presence in a certain way this is obviously the case. But their 'materiality' does not affect the fact that they become resources… but only when incorporated within processes of structuration" (1984, p.33).

This is the main research challenge for the structurational models: although it could be argued that the information technologies *are* social systems that simply rely on the material artefacts for their operations, there is still a 'stubborn' material aspect to technology which is tricky to integrate into Giddens's claim that structures are traced in minds embedded in action.

The concept of *interpretive schemes* is an essential part of the structurational models. Interpretive schemes are understood as standardised, shared stocks of knowledge that humans draw on to interpret behaviour or events, and hence achieve meaningful interaction. The concept of interpretive schemes has long been incorporated in organisation theory, and various ways of mapping cognitive structures have been developed (Heracleous and Barrett, 2001). As implicit in the structurational models, the interaction between communication and interpretive schemes is central to the construction of social reality and thus to agents' actions that are based on this reality. Information technology, by providing a means of representing reality through its set of symbols, also provides a set of interpretive schemes through which users understand technology. Information technology also institutionalises some interpretive schemes– stocks of knowledge–by formalising and encoding them, standardising them, and sharing them such that they are taken for granted (Orlikowski and Robey, 1991).

Many IT researchers have referred to the structuration theory in their works (Barley, 1986; Walsham and Han, 1991; Walsham, 1993, 2002; Orlikowski and Robey, 1991; Yates and Orlikowski, 1992; Jones and Nandhakumer, 1993; Barret and Walsham, 1995). The paper by Barley (1986) is widely recognised as one of the first to address IT from a structurational perspective. The study presented the introduction of CT (computer tomography) scanners into the radiology departments of two hospitals as an occurrence of structuring. The same equipment led to two different social organisations in seemingly similar environments. The paper argued that the technology-driven social change was likely to be rooted in the technology's material restrictions, but that these must be transformed into social forces if the technology aims to effect a social organisation.

In their theoretical overview, Orlikowski and Robey (1991) presented the ideas of Giddens in a discussion about the differences between 'objective' and 'subjective' IT studies. They built frameworks for investigating the interactions between human actors and social structures during information systems development and information systems use. Thus, during the use of IT, a realm of social structure is developed in which users:

- draw on embedded knowledge, assumptions, and rules (a paraphrasing of an organisation's structure of signification);
- work within the rules and capabilities built into them (the organisation's structure of domination);
- work within the authorised options, and the values and sanctions built into them (the organisation's structure of legitimation).

Accordingly, the realm of human action is considered to be established during the use of IT when users (Orlikwski and Robey, 1991):

- appropriate the rules, knowledge, and assumptions embedded in information systems to perform tasks, or modify patterns of use to create new structures of meaning that potentially alter institutionalised practices;
- appropriate the rules and capabilities embedded within information systems to achieve authorised outcomes, or modify patterns of use to create new structures of domination;
- appropriate the legitimate conventions of use within information systems to execute sanctioned action, or modify patterns of use to create new structures of legitimation.

Another influential contribution to the structurational perspective on IT research has come from Walsham. His works include a review of the structuration theory in IT research (Walsham and Han, 1991); an analysis of case studies drawing on structurational models (Walsham, 1993, 2002); and a discussion of the emergence of interpretive IT studies (Walsham, 1995). In his recent theoretical work, he locates structuration within a synthesised analytical framework for the interpretive study of cross-cultural software design and use (Walsham, 2002). This study shows that a structurational analysis can accommodate elements such as the links between contradiction and conflict, cultural heterogeneity, the analysis of detailed work patterns, and the dynamic and emergent nature of culture. The analysis was applied in two cross-cultural global case studies where a software tool had to be produced and used. It was shown that the analysis of structures, culture, reflexivity, and change, and the ensuing conflict enabled a more sophisticated and detailed consideration of issues in cross-cultural software production (Walsham, 2002, p. 360).

Two concepts distinguished within the IT literature have sought to modify the structuration theory so as to suit it to the field of IT. These are the adaptive structuration theory (AST) by DeSanctis and Poole (1994), and the concept of the duality of technology by Orlikowski (1992).

Adaptive Structuration Theory

DeSanctis and Poole developed their theory in an attempt to encompass the mutual influences of technology and social processes, especially in the context of advanced information technologies. The latter are considered to have a greater potential to impact on social aspects of work than the more traditional business computer systems. Initially, AST was developed to study groups that were using electronic group decision support systems (GDSS): “it looks into the processes of human usage of computer systems and at the nature of group-computer interaction” (Poole and DeSanctis, 1989, p.150). AST suggests that social structures serve as guides for planning and accomplishing tasks: designers incorporate such structures into the technology, with the result that the structures may be modified or reproduced (Jones, 1999). DeSanctis and Poole (1994) propose that the social structures provided by technology can be described in two ways:

- structural features of the technology (examples of the structural features of GDSS were identified as the voting algorithms and anonymous recording of ideas that brought the meaning and control)–Giddens’s structures of signification and domination;

- the spirit of the technology that is understood as the general intention of the system with regard to values and goals underlying a given set of structural features (equated to Giddens's legitimation dimension of structuration).

Since IT is only one source of structures for groups, the authors considered other sources of structure such as work tasks and the organisational environment (DeSanctis and Poole, 1994). Another important concept in AST is appropriation. Appropriation is considered to be the immediate and visible actions that demonstrate structuration processes and therefore equates to Giddens's modalities of structuration.

Ruël (2001) defines appropriation as "the physical and mental activities that users of technology carry out while making a selection from the potential set of structures of a technology, represented by the spirit and the technical features, for the day-to-day practices" (p.53). There are four dimensions to appropriation:

- appropriation moves (the ways that users choose to appropriate the available structures of technology),
- faithfulness of appropriation (the extent to which a certain technology is appropriated in line with its spirit),
- attitudes towards appropriation (the users' assessments of the extent to which the structures within the system are useful and easy to use),
- instrumental uses (reasons why the system is used) (Ruël, 2001, p.57).

DeSanctis and Poole (1994) suggested that AST is able to overcome the limitations of over generalised structurational models which, they argue, are exclusively focused on the institutional level and rely on purely interpretive methods. Another advantage of AST is that the appropriation analysis supports the precise documentation of "how technology structures are being invoked for use in a specific context" (DeSanctis and Poole, 1994, p. 133).

To illustrate its potential, we note that AST has formed the basis of many studies (Miranda and Bostrom, 1993; Nagasundram and Bostrom, 1994; Chin et al., 1997; Majchrzak et al., 2000; Ruël, 2001; Hettinga, 2002). It has been shown that the clearer the spirit of IT to the user: the more faithfully they appropriate the technology, the more they perceive it as useful and easy to use, and the more they use the technology in a task-oriented way. The right way to make the spirit of a technology clear to its users is to: (1) achieve an agreement on the reasons for technology introduction, (2) involve the users in the process of development and implementation, and (3) provide organisational support (Ruël, 2001).

Orlikowski's duality of technology

Orlikowski (1992, p.403) defines technology as "material artefacts (various configurations of hardware and software)", but also states that this does not imply an "exclusive focus on technology as a physical object". This leads to the first basis for the structurational model of technology: that "technology is created and changed by human action, yet it is also used by humans to accomplish some action". This is called the 'duality of technology'. Technology is thus seen as 'interpretively flexible', something that is–it is argued–often neglected in the traditional IT literature that treats

technology as a 'black box'. Orlikowski and Robey (1991, p. 153) depict three two-way relationships between institutional properties, human agents, and technology:

- Technology is identified as a product of human action, coming into existence and being sustained through human action, and being constituted through use. That is that technology is built and maintained by humans. As a consequence of such human involvement in the creation of technology, the technology will tend to reflect the assumptions of its developers and designers. Further, the utilisation of technology is to be achieved only through activation or adaptation by humans.
- Technology is also the medium of human action since it facilitates and constrains human action through the provision of interpretive schemes, facilities, and norms. Technology enables human activities in the sense that it can only condition but never determine social practices. At the same time, technology both enables and constrains task execution.
- Institutional properties influence human agents such as intentions, design, standards, and professionalism; technology reinforces or transforms the institutional properties of organisations. "People do not work in a vacuum; they are constantly influenced by the values, interests, expertise, power, culture, and so on, that surround them" (Orlikowski and Robey, 1991, p.154).

In her later works, Orlikowski (1992, 1993, 1996, 2000) has further developed the concept of the duality of technology by applying it to empirical research and extending the structurational ideas. Developing the structurational concepts, Orlikowski (1996) talks about "institutional" (prescribed) versus "on-going", and "enacted" versus "situated" use of technology.

In her recent work, Orlikowski (2000) proposes the 'next extension' to the structurational perspective on technology, one that develops a 'practice lens' to examine how people enact the structures which shape their situated use of that technology. It is argued that "while a technology can be seen to embody particular symbol and material properties, it does not embody structures because those are only instantiated in practice" (p. 406). In other words, Orlikowski reconsiders the structurational 'tradition' in IT research and states that the technology does not embody social structures because structures are rules and resources that can be instantiated only in recurrent practice. This is a new proposition when compared to the earlier structurational models. Instead of analysing how the structures, presumed to be embedded within technology, "are used, misused, or not used by people in various contexts" the practice lens concept proposes framing what people do with the technology not as appropriation but as enactment (Orlikowski, 2000, p. 407). Technology structures are thus not 'external' to humans, simply 'waiting' to be appropriated, but they emerge from people's situated interaction with IT. These enacted structures are labelled "technology-in-practice".

Technology-in-practice is considered as a type of structure. When people use a technology they draw on:

- the properties provided by its material substance and inscribed by the designers and added by users through previous interactions (e.g. specific data content, customised features, or expanded accessories),

- their skills, power, knowledge, and expectations about the technology, influenced mainly by training, communication, and previous experience (Orlikowski and Gash, 1994),
- knowledge and experience of the institutional context in which they live and work.

In this way, people's use of technology becomes structured by their experiences, knowledge, meanings, habits, power relationships, and norms. Such structuring enacts future use as people continue to interact with the system.

One final remark about Orlikowski's view on technology is that she also proposes expanding the understanding of a 'stabilised' technology that was held by the 'traditional' structurational models and social constructivism. She argues that technology cannot reach a stabilisation phase because technology-in-practice is always subject to change as humans change their awareness, experiences, knowledge, power, etc. It is proposed that even though technology-in-practice may become institutionalised over time, this is only stabilisation 'for now'. In every use, there is always the possibility of enacting new structures. Therefore, the practice lens suggests an "open-ended set of emergent structures that may be enacted through recurrent use of technology" (Orlikowski, 2000, p. 412).

To finalise the section about structurational models in IT implementation, we note that even with these few authors it is clear that there are several modes of using structuration in the IT literature. The most ambitious use of structuration theory is considered as an attempt to reconstruct the theory to accommodate technology through the adaptive structuration theory and the structurational model of Orlikowski (Jones, 1999).

Consequently, attempts to 'apply' the theory to the analysis of IT cases are viewed as "less ambitious". As an illustration, we refer to the work of Jones and Nandhakumar (1993) who performed an analysis based on the framework of Orlikowski and Robey (1991) but sought to use the experience to reflect back on the strengths and limitations of the framework. Some of Orlikowski's works are also examples of such an 'application': she has applied structuration in the analysis of CASE tools in a consultancy (Orlikowski, 1993), and to Lotus Notes implementation in two consultancies (Orlikowski, 1996).

The Actor-Network Theory

Actor-network theory has evolved from the work of Michel Callon and Bruno Latour at the Ecole des Mines in Paris. According to Latour, the modern worldview uses one dimensional language operating in a framework of opposing poles of nature and culture. Knowledge and artefacts are explained either by society or by nature. In order to rise above this, a second dimension is needed. It is the process of nature/society construction that results in the stabilisation of a strong network. By selecting this process as a unit of analysis, it is possible to understand the simultaneous construction of culture, society, and nature (Latour, 1991).

In what is called the "actor-network theory", a vocabulary has been developed that makes a distinction between subjects and objects. The word "actant", for example, means more than a human actor. Both humans and nonhumans may be actants. An actant may be enrolled to give strength to a position. An actant may be an automatic door opener (Latour, 1999), or it may be scallops in the sea (Callon, 1987). In networks of humans, machines, animals, and indeed of matter in general, humans are not the only beings with agency, not the only ones who act: matter matters. The important fact here is not that humans and nonhumans are treated equally but that they are relationally defined as arguments or functions in the network.

As Latour (1991, p. 116) notes "instead of being opposite causes of our knowledge, the two poles are a single consequence of a common practice that is now the single focus of a scientific analysis. Society (or Subject, or Mind, or Brain…) cannot be used to explain the practice of science, since both are results of the science and technology making".

The theory considers relevant actors to be co-constructed through their interactions with each other, rather than being defined prior to the technology by the structural boundaries of organisations, divisions, and groups (as opposed to the network analytical models by, for example, Rice and Aydin, 1991). Instead, it recognises that practice may vary and can shape associations of humans and nonhumans. An actor speaks for the network of associations that it fronts; and hence the term actor-network (Lea et al., 1995).

A network is seen as a set of relationships between an actor and its neighbours, and between those neighbours. The actors interact in order to design, install, promote, and maintain the technology within an organisation. The composition of the networks is not predetermined, but it is an empirical matter achieved through negotiations among actor-networks.

Actor-networks are subject to continual processes of definition and redefinition by the actors themselves. The construction of such networks is achieved through the process of translation where sets of relationships among separate projects, interests, goals, and objects are proposed and built. The translation is thus a process of creating an actor-network. Numerous actors within an organisation may be involved in different sub-processes of translation, each with their/its own unique characteristics and outcomes.

The process of translation involves the production of intermediaries. An intermediary is anything passing between actors that defines the relationship between them. This might include texts (reports, manuals, training materials, etc.), technical artefacts (the relatively stable technical elements which combine to form the technology), and human beings with their knowledge and skills. Actors put intermediaries into circulation. They take the latest generation of intermediaries and transform them to create the next generation. The difference between an actor and an intermediary is not determined by the distinction between people and machines.

Finally, the act of translation is achieved through a series of investments of form, where objects that are numerous, heterogeneous, and difficult to manipulate are made less numerous, more homogenous, and more easily controlled while remaining

sufficiently representative of the former as to also facilitate their control (Lea et al., 1995; Callon, 1999).

Actor-Network Theory and Information Technology

The actor-network theory considers two sides of technology: content and context. The definition of technology refers not only to the physical objects and artefacts but also to the activities, processes, and knowledge that go into its design and functioning (Woolgar, 1991). Technology is interpreted and formed through the interactions between the social and technical actors. For example, in the case of an e-mail technology, the technical part would comprise cabling, network protocols, software, and communication structures supported by the system. The social part would include suppliers, network managers, helpdesk personnel, and users. That is, the content of technology is both technical and social. Even more importantly, these elements can be combined and recombined at any time, for example through the choice and configuration of technical elements (Latour, 1999).

The context in which a technology is designed and used also has both technical and social components. In the case of e-mailing technology, the organisation will provide a rich context including individuals, groups, and divisions. Their interactional practices, culture, and norms will shape the technology. However, Lea et al. (1995) warn that "approaches that place great emphasis on the social context of technology use tend to overlook the technical factors that also go to make up the context" (p. 465). These might well include the technical infrastructure in a company, existing technologies, the availability of intranet and Internet, etc.

The question is how to distinguish the content and context of technology if both, traditionally defined, include both technical and social components. Woolgar (1991, p. 68) observes that the two are essentially indefinite and reflexively linked. Both content and context mutually elaborate each other. In other words, technology design involves decisions about the allocation of roles between technology and its environment (Lea et al., 1995, p. 465). The definition of technology becomes the definition of its sociotechnical context (Callon, 1991).

The proponents of this theory argue that an understanding of the process by which technological projects are conducted can be gained by "following the actors" in their interactions; as they construct and elaborate the technology, the context, themselves and each other (Law, 1991). In order to do so, Lea et al. (1995) propose avoiding any prior distinction between different types of actors, or between the content and context of technology, and to adopt the network metaphor to make sense of the numerous heterogeneous technical and social elements that make up both content and context.

In their longitudinal study, Lea et al. (1995) explored the introduction of an electronic communications network at SoftCo, a multidimensional European information company. They traced the IT project from 1988 until 1992, and grasped the process of shaping and reshaping the IT according to the interests of the various actors involved in the project: consultants, users, marketing, internal IT infrastructure. Within the four years, the authors observed 13 crucial steps in the development of the project, including steps back resulting from conflicts and high risks, and steps forward

promoted through negotiations. The e-mail project at SoftCo at first failed to win approval based on cost savings, but was successful in obtaining resources after mobilising the company's clients. The mobilisation of a local network consisting of the project "task force", external suppliers, and the development of a pilot system culminated in a report to top management which resulted in funding for the start-up of the network system. Until this point, the project had followed a very straightforward linear path after a hesitant start. However, further development of the system was frustrated by a lack of resources and the actions of the project team became more reactive. The future development of e-mail was at risk when the e-mail project failed to be positioned in an organisational plan. However, a newly acquired office was networked, and negotiations with this office increased the pressure on the already overstretched local network to develop formal network management procedures. Improved accessibility led to the expansion of external links to the network. A presentation by the internal system department (ISD) to the European partners positioned the ISD as an obligatory point of passage in the development of a European network. However, the ISD failed to convince the European partners to adopt Coordinator software and were in danger of losing their pivotal position. An expansion of the ISD prefaced an acceleration in the development of the new network systems (Lea et al., 1995, pp. 474–475). The authors argue that although their understanding of the project dynamics is rather subjective, it has still meaningfully shown the relative success and failure of the project at a given time in terms of the conflicts between the "actors", and between the local and global networks. One of the conclusions the authors stress is that the relative success or failure of a IT project is determined by the degree of control exerted over the local and global networks and by the conflicts between them.

To finalise this section about the actor-network theory, we would like to emphasise that in using the network metaphor it goes beyond the duality of technology and provides the opportunity to go beyond the division between the content and context and between the technical and social sides of IT.

'Soft' studies in IT research: concluding remarks

A number of conclusions may be drawn from this short review. The first conclusion is about the relevance of the 'soft' research to the IT field. All the models show the effective use of social construction ideas by seeing implementation as an enacted, dynamic, changeable, and situated process:

- Social constructivists see implementation as inscribing the interests of the social groups into technology.
- Researchers of the structurational models view implementation as embedding structures in a recurrent use of IT.
- Proponents of the actor-network theory consider implementation as the creation of an actor-network (translation).

Secondly, in contrast to the 'hard' approach, these studies view people as active enablers of the technology implementation and, therefore, different human agents can use the same technology differently, which may result in different implementation

outcomes. There are some differences, however, in understanding the role of human agents:

- The social constructivists are primarily concerned with the dominant influence of the pre-existing social groups over technology development.
- According to the structurational models, users shape the structures of the systems. This process is based upon the users' experiences, knowledge, habits, norms, institutional cultures, etc. However, human actions are also built during the use of technology.
- Proponents of the actor-network theory argue that the social actors are themselves constructed in part by the technology (during the translation process).

A third conclusion is related to how these studies understand technology. All three approaches acknowledge the "interpretive flexibility of technology", meaning that the technology evolves after the design phase as it is traced by relevant social groups through the constructions of different meanings. However, this vision has different accents:

- Social constructivists focus on how the interests of social pre-groups are "inscribed" in technology. A system is viewed as a physical artefact, but open to more than one interpretation. Through the processes of negotiation, technology becomes stable.
- The structurational models likewise acknowledge the physical artefact of technology, but consider it as much more than that. Different authors refer to the embodied and embedded, enacted and situated, structures of technologies. These structures are all subject to change through human actions: either until the stabilisation phase or, if this is not reached, in an on-going recurrent changing process. However, as has been argued by Jones (1999), the material character of technology 'creates' difficulties for structurational IT research that remain unresolved. As long as the structures are virtual, and exist only in the minds of agents and instantiated in their actions, then the material properties are not important. If, as by Orlikowski and DeSanctis, it is argued, however, that technology is distinctively material, then such concepts do not fit the structurational schemes. As Jones (1999) notes, since Giddens has not provided the solution for such dilemmas, the structurationally-based IT studies will continually strive to resolve this challenge. The recent attention by Orlikowski (2000) to 'technology-in-practice' may point to a way out of this labyrinth by seeing technology as material allocative resources that become structurational resources only when drawn upon in the production or reproduction of structure. However, such an approach would lead to an even more idealist methodology that many IT researchers would be far from happy with.
- The actor-network theory views technology as a sociotechnical actor in which content and context mutually elaborate each other. Technology design involves decisions about the allocation of roles between technology and its environment, where all actors (humans and nonhumans) are seen as equal in the implementation process. Technology becomes subject to on-going changes as do social groups.

The fourth conclusion concerns the practical applicability of these theories. It is an often-mentioned shortcoming of the actor-network theory that it discusses technology

implementation at a very abstract level, and lacks the 'instrumental' part with respect to analysis of the actors and their networks (Callon, 1999). Jones (1999) is of the opinion that the structurational models bring the understanding of IT implementation to a more abstract level than social constructivism and, therefore, challenges the practical applicability of this type of research. We have already mentioned that the soft IT studies, in their attempts to echo the dynamic reality of IT implementation, might be a step 'too far' from the practice of IT projects. They may give an understanding to the process of IT implementation but this may prove rather abstract for practitioners in terms of results and recommendations.

A final remark concerns an issue that was also found in what we reviewed as 'traditional IT studies'. While considering the interactions between human agents and technological structures or artefacts, or between actors in a global or local network, we would argue that the soft models do not pay sufficient attention to the mechanisms of human-human interactions during the implementation of technology. These interactions are probably included to some extent in the enactment of the structures or networks (as Orlikowski noted about the role of communication and power relations). However, we did not find an elaborated investigation into the mechanisms of human-human interactions during the use of a technology and their influence on the implementation process, and we consider this aspect to be significant in the networked practices of today's IT projects.

2.2.3 IT implementation in this research and feedback to the preliminary research model

Having discussed the two approaches in some detail, we will now present our standpoint on the basis of the previous discussion.

In our research, we consider technology as a material 'object': a real system with computer-based touchable components. It is introduced to the targeted users, and people have to get used to it. We will not explore how technology (its structures) changes over time through human actions or the creation of networks.

Rather than starting with technology and examining how people appropriate, adapt, or accept its properties, we shall start with the people and explore how they develop their work with the system. Whether through mistake or intention, users often ignore, alter, or play around with the "anticipated', "inscribed", and "institutionalised" technological characteristics. For example, many of us use powerful software such as Microsoft Outlook but, in our regular work, most of us work with less than 20% of its functionality, focusing on those tools which are helpful in accomplishing out tasks (simple e-mailing and simple calendar tasks), and ignore the rest.

Even if technology is given, and its use is mandatory, employees will influence their recurrent work with it through developing certain interpretive schemes such as making preferences, new rules for the work being automated, new task facilities, norms (e.g. traffic regulation), interpersonal interaction through IT, modification of technological properties, choosing or ignoring optional properties, and inventing new ones. This means that different people under different conditions will experience technology

differently, and our research interest is to investigate how and why these differences occur.

We side with the soft IT tradition in our treatment of implementation as a dynamic, enacted process. However, we part ways over the basis of our understanding of technology. We put employees at the centre of the implementation process and make them responsible for the implementation of a newly introduced technology.

Now we return to an earlier question: when does the implementation of IT end–when are the prescribed issues complete–when does a system achieve stabilisation–or should we accept the fundamental "open-endedness" of technology implementation?

Having accepted that human interpretive schemes can endlessly change the ongoing use of technology, it would be easy to conclude that the use of technology can never be stabilised, that every engagement with the system is contextual and temporal (Orlikowski, 2000). However, starting from the users' point of view we consider that implementation is complete when users contentedly work with an IT, having acquired the necessary skills to master the program, fully understand the IT, and are ready to enact the above-discussed rules and norms. This means that although a system may still require changes after some time in use, the implementation is complete because employees feel comfortable working with it, are fearless of any technological modifications, and appreciate performing their job tasks through the system.

This means that we are looking at the *stable use* of groupware technology, by a group of users, rather than looking for the stabilisation of technology. Our main indicator of successful IT implementation will be skilful and task-consistent operating with the technology by the targeted employees. Goodhue and Thompson (1995) introduced the concept of task-technology fit when considering the connection between the functionality of a technology and the task requirements of users (p. 214). This concept is close to our understanding of task-consistent use of technology: groupware users will operate task-consistently if the technology assists them in performing their task portfolio. It is related, but not limited, to the concept of technology usefulness, where the key component is the extent to which using a particular system would enhance the job performance (Davis, 1989).

It is an appropriate time to introduce our definition of IT implementation.

We define the implementation of IT as *the adoption of a system during the transition period between the technical installation of a new system and its skilful and task-consistent use by a group of the targeted employees*.

However, stable use of IT is not sufficient to determine the success of IT implementation. The majority of such IT implementations are developed within project frameworks within companies. As a project, the implementation needs to meet timescales and budgets. This requirement will be used as a measure of efficiency in our study. There are different understandings of efficiency associated with IT projects. For example, Ewusi-Mensah and Przasnyski (1994) distinguish IT project failure and IT project abandonment. The former is considered as the disfunctioning of IT after its full implementation, which can be caused by badly designed technology or by failure in usage. By IT project abandonment, the authors consider a situation in which management decides, for whatever reasons, to discontinue for the short term, or

withdraw permanently, a project under development (Ewusi-Mensah and Przasnyski, 1994). Although, in general, IT project abandonment is perceived of as at least partial failure, it should not be always considered negatively. Ewusi-Mensah and Przasnyski (1994) state that it may be a good and acceptable managerial practice if it prevents further useless investment.

The Standish Group (2001) introduced the project resolution perspective in order to estimate IT project efficiency. They categorise IT projects into one of three resolution types: (1) the IT project is completed on time and on budget, with all the features and functions originally specified (efficient, or successful), (2) the IT project is completed and operational but over-budget, late, and with fewer functions than initially specified (challenged), and (3) the IT project is cancelled before completion or never implemented (inefficient, or failure).

At this point we have enough information to complete the next feedback loop in our interim research model (Figure 2.3).

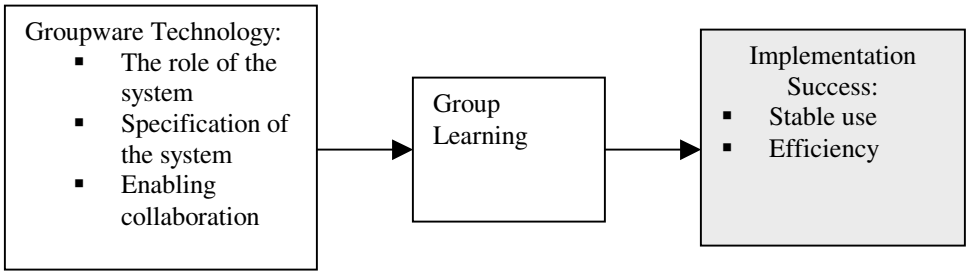


Figure 2.3. Interim research model–3: Implementation of groupware through group learning

2.3 THE GROUP ESSENCE IN IT IMPLEMENTATION

If we consider implementation as a user-centred process in which the employees together develop their interpretive schemes about a new information technology, then the words 'developing and together' become crucial when we explore the role of human-human interactions during the use of technology. Therefore, we propose to take a closer look at the group essence in IT implementation which, in our view, is at the very heart of the implementation of groupware.

Consider a 'given' situation in which the employees will want to or have to work together since they have just been linked by a new software network–what is likely to happen?

Nobody will dispute that people are social beings, and interaction is a normal part of everyday lives. If they want to or have to perform tasks together using a new technology, they will communicate, talk, discuss, praise, complain, and share experiences. The new system will become a new topic in storytelling: recalling good

or bad experiences with it, giving advice to each other, telling anecdotes about mistakes. During this process, all will develop a common understanding about working with the system. Within given or created interdependent tasks, employees will probably seek a community consensus in together developing their work with the technology. In other words, anticipating any technological change will require communications with all the networked users if their interdependence is based on the functionality of the IT. As a result, implementation of groupware may "drift" (Ciborra, 1996) from its intended use through these intercational processes. Drifting here means a slight or significant shift in the role and functions in concrete usage situations, compared with the planned and predefined objectives. "Drifting", notes Ciborra, "should not be considered as a negative phenomenon per se: it can occur for both successful or failing applications" (Ciborra, 1996, p. 8).

As we indicated earlier, users always have the potential to change the ways of working with IT. As opposed to the traditional approaches, 'soft' IT studies have applied this fact to the introduction of collaborative technologies (e.g. Bikson and Eveland, 1996; Orlikowski 1996), and shown that they do not follow a straight path that can be laid out in advance.

Having recognised this, it is important not to overlook the fact that the users cannot endlessly change the technology. Having multiple employees engaged in a common task through the system will decrease technological malleability. There are certain technical limits created by the physical artefact anticipated by the designers, developers, and the technical administration of IT projects in organisations. Moreover, organisational complexity does decrease the extent of potential alternative uses: working with a stand-alone computer is likely to be more flexible than working with a computer integrated into an organisational network.

What does all this mean for our study? The group essence in IT implementation reflects that groups are developing common interpretive schemes about the technology they use, through interaction processes amongst themselves. In their turn, these processes have a direct effect on the increasingly complex working lives of employees as a new system for use in performing their job tasks is introduced. Therefore, groupware implementation will inevitably involve complex group processes among the networked employees.

2.4 LEARNING AND IT IMPLEMENTATION

The first draft of this section was entitled "group learning and IT implementation in the existing literature". However, examination of the existing studies has convinced us that there is not much theoretical or empirical research yet completed with a particular focus on the role of group learning in explaining and resolving the problems of implementing and using information technologies in organisations. The emerging studies that do attempt to address both organisational learning and information technology consider learning as an alternative antidote to the organisational struggles with IT. The overview of the literature about IT and organisational learning by Robey et al. (2000) supports our idea, they state: "the link between IT and learning has only begun to be explored" (p. 127). We will show that the existing research addresses only

limited issues in organisational learning, and lacks a systematic theoretical elaboration of group-level learning.

Based on the works of Robey et al. (2000) and Levine (2001) we describe the current state of the link between 'learning' and 'IT implementation' in the literature as a two-fold set:

- formal training as a way to overcome knowledge barriers
- the role of experience in IT implementation.

Literature on formal training in IT implementation is usually focused on the individual level. Such studies deal directly or indirectly with overcoming barriers to acquiring new knowledge in IT use. Robey et al. (2000) assume that this kind of learning improves IT implementation through the enhancement of communication between users and system analysts (p. 135). One approach, developed by Salaway (1987), has shown the differences that result from defensive and open communication during formal training. The results of that study have shown that a training programme based on the exchange of authentic information between participants leads to more effective organisational action. Such a valuable source for individual learning has, however, practical limitations: acquisition of the required communication and instructional skills by the systems professionals is not easy in practice.

The second, and the main, literature stream about learning and IT implementation is the research on experience-based organisational learning. Strong evidence indicates that an organisation's own experiences provide a knowledge base to guide future actions. Case study literature reports several details about the role of experience in IT implementation: some provide evidence of the benefits of experience in achieving a successful implementation (Caron et al., 1994; Yetton et al., 1994); while others illustrate the difficulties of learning from experience (Robey and Newman, 1996; Ang et al., 1997).

Thus, one may conclude from the retrospective interpretations by researchers that an organisation's experiences may affect subsequent implementation success (Robey et al., 2000). However, these studies do not account for instances where organisations fail to learn from their own experience. Another limitation is that the authors do not discuss the 'competition' between the recent and earlier experiences. How can an organisation adapt an old experience to a new situation? Obviously, learning from experience is more complex than simply adjusting action based on it. So, unfortunately, although numerous interesting observations have been made, there is a lack of a theoretical conceptualisation and therefore it is impossible to generalise. What are the common key issues and processes in experience-based organisational learning? How can one transfer conclusions from an IT experience in one company to another, and is this necessary? Finally, when and where are the lessons applied and really learnt? These questions remain unanswered in the existing studies.

What does this mean for our research? First, the studies have shown that experience does play an important role in learning during IT implementation. Secondly, the existing research in this field is mainly focused on the 'lessons learnt' approach, and presents case studies describing either triumphs or stories of war in IT projects. Thirdly, a systematic conceptualisation and operationalisation of the learning is still missing: what is meant exactly by learning in IT studies? There is no clear view on

this; for example, one finds mixtures of learning as a process and learning as a result. Fourthly, the centre of attention in the research is the organisation-level, rather than individual and group learning. While we are convinced that group learning does contribute to the success of implementation, we would argue that this calls for a careful conceptualisation of experience-based learning as applied to the group level in IT implementation. In the next section, we develop a theoretical basis by addressing two perspectives: group learning, and experiential learning. Following this, we will apply *experience-based group learning* to the IT implementation process.

2.5 CONCEPTUALISATION OF IT IMPLEMENTATION AS EXPERIENTIAL GROUP LEARNING

In order to bring a conceptual understanding of group learning in IT implementation, we shall first look at the literature on learning in order to clarify: (1) how to define learning, (2) experiential group learning, and (3) what will be the focus in our own research.

2.5.1 Definition of learning

Organisational learning is presented in the literature in two different ways: some discuss learning as an outcome or 'intended product' (*what* to learn); others focus on the process they define as learning (*how* to learn). For example, Agyris and Schön (1978) define learning as a process of detecting and correcting error. Kolb (1984) stresses the importance of the transformation of human experience (the process) that leads to new knowledge (the result). It is also noted that an outcome of the learning process could be a more experienced person, who might have a changed self-conception (Jarvis, 1987). Marsick (1987) focuses on learning as acquisition, interpretation, or assimilation of information, skills, and feelings.

The 1990s' idea of life-long learning broadened the concept of learning with the view that human development does not stop at the start of adulthood; but continues throughout the lifetime of an individual (Dixon, 1994). Common to most definitions is the idea that something changes during learning. These changes themselves are considered both as a process and as outcomes. According to various concepts, they might be related to a range of changes in human behaviour, capacities, competencies, knowledge, experience, etc.

We follow this research tradition in treating learning as a process and define it as *changing knowledge and behaviour*. With this, we attempt to articulate the behaviour through which such changes as adaptation to change, greater understanding, or improved attitudes can be achieved.

In the next section, we elaborate on the concept of experiential learning as a process at the group level.

2.5.2 Experience-based group learning

From the models of experiential learning (e.g., Kegan, Torbert), we have chosen the experiential learning theory of Kolb (1984). The choice of this concept is based on four considerations. First, it focuses on learning as a process rather than the outcomes. Secondly, the concept of 'experience' is central. This provides us with the opportunity to 'begin' the learning process *after* the employees get a new technology and start working with it: that is when they gain 'experience'. Third, this approach suggests problem-solving learning that is always practice-oriented. Finally, learning is perceived to be a mechanism of everyday activity, occurring both consciously and unconsciously. Combined with thinking and deciding, the unconscious processes are transformed into conscious ones and play an important role in getting used to a technology.

We will first briefly present the model by Kolb (1984), and then show how its main limitation is related to applying it at the group level. After this, we will 'tweak' the model so as to apply it to the group level.

Kolb's model of experiential learning

Kolb (1984) acknowledges that his theory is built upon a set of theoretical traditions, including Dewey's pragmatism, Lewin's social psychology, Piaget's cognitive development, and Maslow's humanism. The theory is grounded in the concept that people have a natural capacity to learn, and experiences act as a catalyst for engaging in this process (Kayes, 2002).

The theory is based on six major assumptions, i.e. that learning: (1) derives from experience, (2) requires an individual to resolve dialectically opposed demands, (3) is holistic and (4) integrative, (5) requires interplay between a person and an environment, and (6) results in knowledge creation (Kolb, 1984, pp. 25–38).

Learning involves the interplay between two interdependent dimensions of knowledge: acquisition and transformation (Figure 2.4).

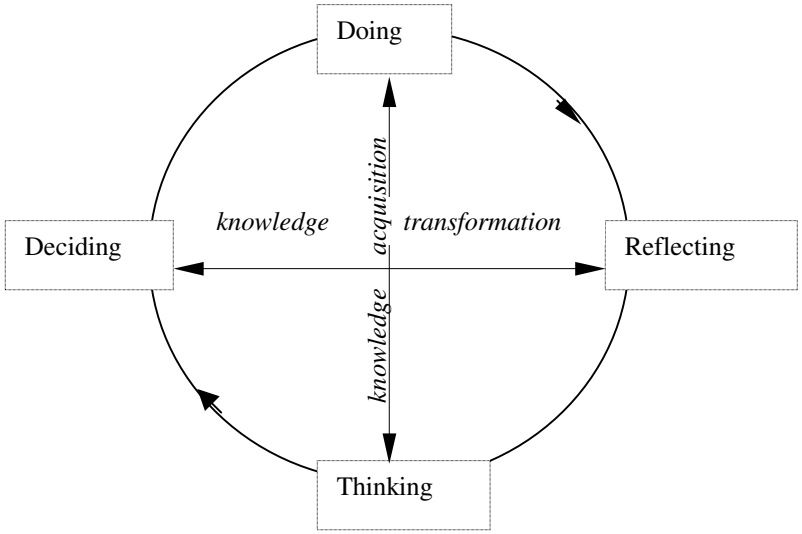


Figure 2.4. The experiential learning cycle (Kolb, 1984)

Knowledge acquisition demands from an individual the resolution of the tension between apprehension (concrete experience) and comprehension (abstract conceptualisation). Apprehension requires an individual to accept new knowledge through direct experience with the world (feelings, emotions). In contrast, comprehension occurs when an individual obtains knowledge through abstract concepts; in other words, when a person breaks down experience into meaningful events.

Another dimension of knowledge is transformation which also shows a dialectical tension: between intention (reflective observation) and extension (active experimentation). During knowledge intention, a person learns by reflecting upon previously acquired knowledge. In contrast, learning by extension requires an individual to interact with an external environment.

These four processes make up the learning cycle. In responding to the dialectical tensions of knowledge, individuals orchestrate their way around the cycle as a continuous process of interactions between personal and environmental demands (Kayes, 2002).

The cycle begins when one experiences the world through one's actions–'doing' (Dixon, 1994). Immediate, concrete experience is the basis for the next stage–'reflecting', and allows us to learn from our experiences. The observations are assimilated into a theory–to make sense of what we have experienced. The third step is abstract conceptualisation, or 'thinking'. The final phase is 'deciding', and actively testing the concepts that were created from a real world experience. After the fourth step, new implications for concrete action can be developed. Thus, one continually cycles through a process of collecting experiences–or a set of conceptualisations (Swieringa and Wierdsma, 1994).

Although there are other models of experiential learning, Kolb's theory attracts attention because of its completeness and generalisability. Since 1971, over 1,500 studies, refereed articles, dissertations, and papers have reflected the work of Kolb, and provided insights into a broad range of learning processes (Kayes, 2002). The basic 'wheel' has appeared in a variety of studies. Argyris and Schön (1978) refer to a *discovery–invention–production–generalisation* cycle of learning. Deming (1993) depicts a *do–check–act–plan* wheel. Kim (1993) bases his model on Kofman's version as an *observe–assess–design–implement* cycle. Senge et al. (1994) build the wheel as *a doing–reflecting–connecting–deciding* process. Swieringa and Wierdsma (1994) refer to a *doing–reflecting–thinking–deciding* wheel. Crossan et al. (1999) describe the '4I' model: *intuiting–interpreting–integrating–institutionalising*. As Schippers (2003) argues, "all proposed learning cycles state that it is important to experience or observe, reflect on the experience or observation, and decide or act accordingly" (p.16).

To conclude, the theory of Kolb combines impulsiveness, feelings, and individual insights with rational thoughts, reflection, and actions. "It maintains the humanistic belief in every individual's capacity to grow and learn, so important for lifelong learning" (Miettinen, 1998, p.170). All of this makes the theory comprehensive, fully generalisable, and attractive to both proponents and opponents. Of course, there are certain limitations to the model, and these are described in the next section.

Limitations of Kolb's model

Kays (2002) states that criticism of the theoretical limitations of Kolb's model began to emerge in the early 1990s. Opponents suggested that the emphasis on individual experience should be expanded to include social aspects of learning (Holman et al., 1997; Vince, 1998; Reynolds, 1999; Kayes, 2002).

Kayes (2002) noted that while Kolb outlines the relationship between individual and social knowledge, little attention is paid to the elaboration of this link and, therefore, the theory becomes open to criticism. In Kolb's original text we read:

> "Apprehension of experience is a personal subjective process that cannot be known by others except by the communication to them of the comprehensions that we use to describe our immediate experience… From this it follows that there are two kinds of knowledge: *personal* knowledge, the combination of my direct apprehensions of experience and comprehensions I use to explain this experience; and *social* knowledge, the independent, socially and culturally transmitted network of words, symbols and images that is based solely on comprehension" (Kolb, 1984, p.105).

The critics suggest 'solutions' by implementing a movement between intra- and inter-personal learning on the basis of Kolb's theory. However, such solutions are rather abstract: for example, Holman et al. (1997) propose including in the Kolb model a series of linguistic acts as argumentations and social response. Kayes (2002) proposes a "K" scheme that modifies Kolb's initial formulation by depicting experiential learning in poststructural terms (p.145). The "K" scheme separates experience and reflection (internal representation) from action and abstraction (social action).

Overall, Kolb's limitations in terms of experiential learning are mainly related to the centrality of individual experience in learning. If we understand learning as changing knowledge and behaviour, then we should acknowledge the importance of social experience for learning. Some authors propose bringing a social context into Kolb's model. However, even they do not draw a clear picture of the social (group) processes. In the next section, we offer our framework that expands on Kolb's initial formulation by transferring individual learning processes to the level of the group.

Group experiential learning

In order to build our understanding of group experiential learning, we first need to define group learning. The existing literature shows two facets in the understanding of group learning. One is that group learning is considered as the outcome as development (construction, generation, or implementation) of collective knowledge (Purser et al., 1992; Brooks, 1994; Kasl et al., 1997; Lynn et al., 2000; Stahl, 2002). The other approach defines group learning as group interaction activities (processes) through which individuals improve their knowledge (Edmondson, 1999; Druskat and Kayes, 2000; Akgün et al., 2002). This understanding focuses on the ways of creating new knowledge (interaction processes), and puts the individual at the beginning of the process of developing collective knowledge.

Another observation drawn from the literature overview supports the idea that studies often concentrate on investigating diverse group processes such as (a) posing a

problem, integrating knowledge, gathering data, disseminating information (Brooks, 1994); (b) asking questions, discussing errors, seeking feedback, sharing information, experimenting (Edmondson, 1999); (c) transforming perceptions, testing hypotheses, experimenting, crossing boundaries (Kasl et al., 1997); (d) interpersonal understanding, proactiveness in problem solving, creating clear work procedures (Druskat and Kayes, 2000); (e) recording information, retrieving information, developing common goals (Lynn et al., 2000); information acquisition, information dissemination, unlearning, thinking, improvisation, and sense-making (Akgün et al., 2002).

The existing literature on group learning has provided us with a good understanding and definition of this phenomenon. We consider group learning as interaction activities between members of a group resulting in changes in their knowledge and behaviour.

We define group learning as *group interaction processes through which members of a group change their knowledge and behaviour.*

In order to build a systematic framework for group learning processes based on the experiential cycle, we have transferred the individual learning cycle of Kolb to group learning processes. As a result, the cycle of "doing-reflecting-thinking-deciding" (Kolb, 1984) is transformed into a collective one of "collective actions–group reflecting–knowledge disseminating–sharing understanding–mutual adjustments" (Figure 2.5).

The central challenge in such a transformation lies in the knowledge domain. Since knowledge is a very social phenomenon, the group learning cycle is more that simply multiplying individual learning processes, or 'rephrasing' individual to group activities. The character of the processes changes as they acquire a social context (including one another's experiences, lessons learnt, and group traditions).

Following Kolb's framework, we will consider group learning as the interplay

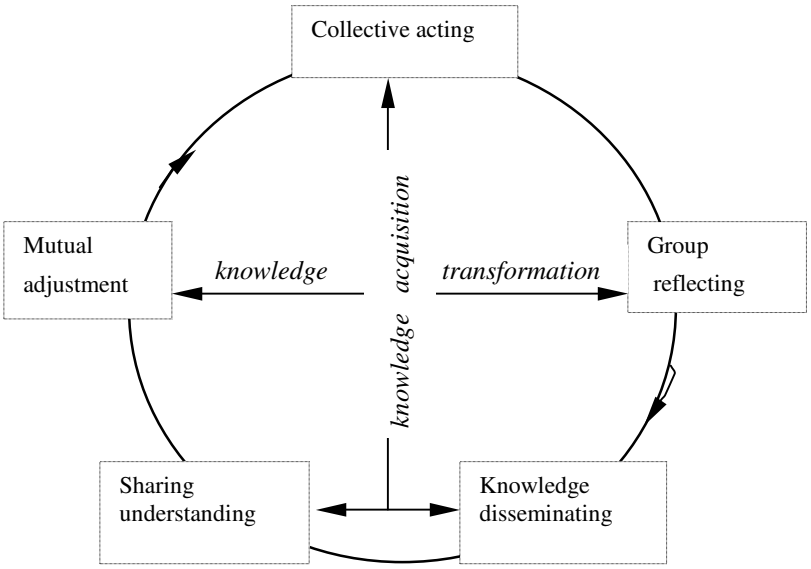


Figure 2.5 Experience-based group learning

between two interdependent dimensions: acquisition and transformation. Each dimension requires the group to resolve the dialectic between two group-learning tensions.

The knowledge acquisition dimension involves the tension between group 'doing' processes, or actions (apprehension), and group 'thinking' (comprehension). Group thinking brings, in our view, a crucial difference: it involves two processes– knowledge disseminating and sharing understanding.

The knowledge transformation dimension of group learning is also characterised by a dialectical movement between knowledge intention (group reflecting) and knowledge extension (group deciding, or adjustment, activities).

Collective acting

A group learning cycle begins with the *collective experiences and actions* when a group of people is given a certain task to perform. This step reflects apprehension of knowledge: when a group is expected to accept new knowledge through perceptions and direct experiences. According to West (2000), action refers to the goal-directed behaviours relevant to achieving the desired changes in team objectives and strategies. This stage is assumed to be important in all learning cycles as it helps to check assumptions. Acting might lead to new information, which can lead to further reflection, planning, and new action as part of an ongoing process (West, 2000).

When a new technology is introduced to targeted employees who are networked together, they will start to operate with the system in order to execute tasks. This can develop through various activities, including operating with basic modules in everyday task performance, or searching for new techniques in the system. The employees can simply replicate the techniques they have learnt during instruction, or they can try to uncover new functionality in using the system. The more experienced members of a group may take an initiative to test new techniques.

Group reflecting

The next stage is *group reflection*–the extent to which group members reflect upon, and communicate about the group's objectives and strategies (e.g. decision-making), and update them to the current circumstances (Schippers, 2003). A group is expected to look inwards to reflect upon previously acquired knowledge. Reflection takes place through a variety of activities: discussions, asking questions, declaring difficulties, collective debates, presentations that aim at knowledge externalisation. This is considered crucial in learning from experience because it can help to neutralise biases and errors in group decision-making. Schippers (2003) stresses that reflection is also an important tool for recognising the potential errors and biases, and consequently for raising awareness of the ways in which groups can deal with problems (p.23). Research shows specific circumstances in which reflection plays a crucial role: it is considered to be the most important factor in information processing tasks (West, 2000), highly interdependent tasks (Gladstein, 1984), and non-routine complex decision-making activities (Schippers, 2003).

There has been significant research into group reflective processes. Swift and West (1998) have identified three levels of reflection based upon its depth. Shallow reflection is seen as the first level of group awareness (for example, discussing aspects of tasks). Moderate reflection is viewed as a more critical approach towards tasks (for example, discussing strategies used by a group to accomplish the tasks). Deep reflection occurs when a group questions the norms and values of the group or an organisation. Schippers (2003) summarises that reflective group behaviour includes the evaluation of actions, ascertaining whether everyone in the group agrees about the way in which a task will be handled, discussing the effectiveness of working and communication methods, and discussing the norms and values of the groups and the organisation.

A group may reflect on its knowledge before taking action, during task execution, or later. Reflection before task execution may include open dialogue about strategies and goals. Reflecting during task execution usually aims to identify whether a group is still 'on track'. This can be achieved through organising dialogues, forum groups, and discussions (Schippers, 2003). Reflections after task execution is characterised by the evaluation of the performance that might lead, in our model, to knowledge extension during the 'deciding' processes.

In the situation of the introduction of a new technology, group reflecting can also take place at various stages: after some operations with the system, but it can also happen even before the system is introduced if future users discuss design issues of the technology. Whichever, group reflecting includes communicating about the extent to which the system supports the performance of tasks. Discussions, open dialogue, focus groups, and meetings with a project team might all concentrate on raising difficulties with using the system, comparing it with other software experiences, and with other IT, or raising individual problems in system use. Users might express doubts and suspicions, or trust and beliefs, in the existing ways of solving IT-related difficulties; or consider possible reasons for, and outcomes of, mistakes made during operating with the system; or discuss errors in working with various IT functionalities.

Knowledge disseminating

The *knowledge disseminating* step introduces the key difference between individual and group learning. In transferring individual learning into a cooperative one, the act of knowing becomes more complicated. In the individual learning cycle, Kolb talks about 'thinking' as the comprehension that occurs when breaking the action down into meaning. Knowledge is considered as the residue of thinking (McDermott, 1999). In a group environment, people would have to 'think together'–that is they would share the results of their individual thoughts. However, knowledge is not something that can be easily passed around (Hendriks, 1999). Orlikowski and Robey (1991) write, "from the subjective point of view, human interaction involves the communication of meaning, and this is achieved via interpretive schemes, which are stock of knowledge that humans draw on in the production and reproduction of interaction" (p.149).

Certainly, some information can be codified, stored, and reused to enable effective action at a later stage, but representation is not equivalent to knowledge (Sutton, 2001). We will now attempt to clarify these processes.

With the assumption that knowledge is created through transfers between explicit knowledge (that is transmittable and communicable in formal language, and often referred to as information) and tacit knowledge (that has a personal quality and is hard to communicate), there are four modes to the knowledge conversion process that can take place in group learning: externalisation–from tacit knowledge to explicit knowledge; combination–from explicit knowledge to explicit knowledge; internalisation–from explicit knowledge to tacit knowledge; and socialisation–from tacit knowledge to tacit knowledge (Nonaka, 1994; Kwok et al., 2002).

In other words, to break experiences down into meanings, a group would have to go through two phases: firstly, the reconstruction and codifying of knowledge (externalisation and combination); and, only then, could the knowledge can be shared, or transformed, to a tacit form (internalisation and socialisation) (Hendriks, 1999). Here, we label these phases as knowledge disseminating and sharing understanding.

Knowledge disseminating can appear in many forms; including presentations, lectures, oral explanations of ideas, or 'codifying it in any intelligent knowledge system' (Hendriks, 1999). This process is not necessarily conscious. For example, employees can learn by watching someone's performance even if they are unaware of the specific knowledge needed for the task's performance. However, we believe that in almost all practical situations where knowledge sharing is to occur that it is important to stimulate 'knowledge owners' to externalise their knowledge in a way that is suitable for others.

Knowledge disseminating during the implementation process of a new information system would include behaviours by the group members that aim to externalise ideas about the system in order to improve its usage. It might emerge in demonstrating the operation of technical modules in both formal (workshops) and informal situations (work breaks), proposing new actions to improve the usage, clarifying difficulties, and peer questioning.

Sharing understanding

The wheel then rotates to *sharing understanding*. This involves using insights to help people better see their own situations (Kim, 1993). This internalisation also takes in a great variety of forms: learning by doing, reading books, etc. It is oriented towards those people who look to acquire knowledge. It implies the informal mutual acceptance and respect of diverse ideas and suggestions. Nelson and Cooprider (1996) define sharing understanding as the appreciation of knowledge among group members that affects their mutual performance (p.410). Appreciation among group members is characterised by sensitivity to the frames of reference and to the interpretations of others in the group. Effective shared understanding can be viewed as a synergy between group members based on mutual respect and trust. Appreciation and trust are the two main components of shared understanding.

Knowledge internalisation concerning new technology will lead to a common meaning of the system among the users. They will share their understanding of the global role of the IT in their company and its intentions for every member of a group, and the design intentions of the developers of the system. An understanding of the

technical possibilities and various functionalities (essential and optional) can also be considered as a result of this stage. A group will arrive at a common attitude towards the technical and content functionality of the IT: whether the technology helps to accomplish job tasks and personal responsibilities, and to what extent.

Two processes–knowledge disseminating and sharing understanding–build interpretive schemes about technology within a group of users. They create the core of mutual system knowledge among users.

Mutual adjustment

The final step in cooperative learning is *mutual adjustment*, arrangements initiated by the group members. In Kolb's model, this step ('deciding') is related to the extension of knowledge when learners move beyond themselves to interact with an external environment. Reflection and knowledge sharing do not lead to changes in group learning. In this stage, a group will engage in activities that lead to a choice to make decisions together, to evaluate, to reject or adopt, or to ignore, tasks, strategies, and new rules.

Some adaptations need to occur: joint regulations, planning, arrangements, and decisions are activities that need to be undertaken by group members in order to move the learning cycle forward. In this phase, goals are presented and ways to achieve them are planned. According to some authors, adjustment takes place not only before task execution, but also during it (Schippers, 2003).

In a situation involving new technology, this step in the group learning cycle will include activities aimed towards collective agreements to improve the use of the system in the group. Group members may take initiatives to arrange (or request) additional training, instructions, manuals, and other learning activities. Developing regulations in order to improve the use of technology can become a crucial issue, especially if the users have never worked before as a group. For example, this could involve decisions about dividing responsibilities for making inputs, and schedules for making outputs. Decisions may be also made about the sorts of documents to be submitted, or about data traffic and classification. The IT might also concern group process issues such as developing regulations for intermediate evaluations of the IT project, supporting on-line chat about topical issues in the project, and news overviews. Such plans will be implemented in the action phase. Once planning is complete, implementation starts and this provokes a new turn of the wheel starting with collective acting.

The new learning cycle will build upon the existing group experience and knowledge. Planning can also take place during the action or execution of a task, when plans are developed and shaped by seeking feedback, and group reflecting processes. This increases the importance of group reflexivity.

After this detailed discussion of group learning, and especially experience-based group learning, we shall take the final step and link the group experiential learning cycle to IT implementation.

2.5.3 The group experiential learning cycle in IT implementation

In the previous section, we noted how group interaction processes will take place during system implementation. Now, we will crystallise those issues that are at the heart of our research.

For us, four aspects of group learning in IT implementation are important: (a) learning is a process-based activity, (b) it rests on the interaction processes between members of a group, (c) those processes begin when a new system is introduced, that is when the users start to experience the technology, and (d) those processes might lead to changes in knowledge about the system (through interpretation) and in users' behaviour (ways of operating with it).

Now we are in a position to give a specific definition. By group learning in IT implementation, we mean *all the interactional processes in a group through which group members develop their interpretive schemes about a newly introduced technology, and that help them to adopt it*. In this, we emphasise that the result of group learning will be improved knowledge, or interpretive schemes, about technology and how to operate it.

In the previous section we introduced five group learning processes, and now we will relate them to the implementation of IT.

1. Collective acting is the task-related operations with a system undertaken by members of a group. After a system is introduced to employees, they begin to use it in order to fulfil their tasks: operate with the basic or optional functionalities, search for new possibilities, etc.
2. Group reflecting is the communications upon the extent to which the system supports the performance of tasks. Recent research has shown that group reflection tends to be most intensive when job tasks involve information processing and interdependency (Schippers, 2003). Both information processing and task interdependence are prerequisites for working with information technology. Examples of group reflecting activities in IT implementation are discussing errors, declaring individual difficulties in operating with IT, asking questions, and comparing with other software experiences.
3. Knowledge disseminating–behaviours of group members that aim at the externalisation of ideas about the system in order to improve its usage. This process is important because it makes the explicit knowledge about technology and its use available for the members of the group through presentations, demonstrations of how to operate with different modules, clarifying difficulties, etc. Sensitivity, trust, and respect for different ideas are important.
4. Sharing understanding–creating a common meaning of the system in terms of the role of the system and its functionality. At this stage, users internalise the ideas and information about the technology in such a way that it becomes their personal knowledge. The shared knowledge includes common attitudes towards the technical and content functionality of the system, its intention for a company and for a user, and an understanding of how to work with the technology.
5. Mutual adjustment–activities that aim for collective agreements on the use of the system within a group. This step bridges discussions and the sharing of

understandings with actions: concrete rules on how to work with the system, suggestions for further improvements, plans to arrange activities to improve the use of the system.

Having presented five processes in group learning for IT implementation, we will briefly summarise the main ideas of this section.

2.5.4 Input to the temporary research model

So far, we have shown that the emerging literature addresses the link between learning and IT implementation. The main focus has been on the experience-based organisational learning that is known as the 'lessons learnt' approach in IT studies.

The majority of the studies have been dedicated to reflecting on the experiences at the organisational level. The role of learning processes at the level of individual and networked users is yet to appear on the research agenda. The existing 'lessons learnt' case studies have convinced us of the importance of experience in IT implementation. However, they resemble 'war stories' with their lack of theoretical conceptualisation of experiential learning.

For this reason, we have searched for relevant concepts from both group learning and experiential learning. The numerous studies on group learning processes have illustrated the range of possible concrete group interaction processes and provided us with an understanding of group learning as interaction processes between the members of a group. We then developed Kolb's concept of experiential learning so that we could apply it to group interaction processes and then, more specifically, for IT implementation processes.

Following this, group learning in IT implementation can be understood as interactive group processes that include five steps: collective acting, group reflecting, knowledge disseminating, sharing understanding, and mutual adjustment. Figure 2.6 represents the latest refinement to the research model:

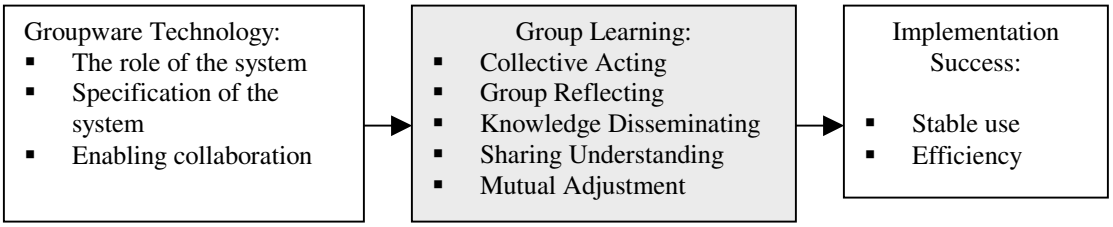


Figure 2.6. Interim research model–4: Implementation of groupware through group learning

2.6 CONTEXTUAL CONSTRUCTS

We should also look at the larger picture surrounding IT implementation. Group learning is not an isolated process, and it may be interrelated with many social and technical issues in an organisation. However, we cannot investigate all of them. In order to make our research operational, we will limit it to the, in our view, most important contextual 'environment' for IT implementation. This will include the characteristics of groups of users (Section 2.6.1), and managerial support issues (2.6.2).

2.6.1 Groups of users

It is clear that we have to take into account the types of groups we are investigating: whether we have 'special' groups and 'special' collaborative prerequisites or not. These issues are discussed in this section.

Studies of work groups in a variety of organisational settings have shown that group effectiveness is enabled by structural features such as well-designed tasks, an appropriate composition, and a context that ensures the availability of information, resources, and rewards (Hackman, 1987). Many researchers have concluded that the structure and design, including equipment, materials, and pay systems, are the most important variables fin improving team performance (Campion et al., 1996). According to this earlier research, organisation and structure explain most of the variance in group effectiveness.

In contrast, organisational learning research has emphasised cognitive and interpersonal factors in explaining group effectiveness (Edmondson, 1999; Druskat and Kayes, 2000).

From the many group aspects explored by other researchers, we have selected those which are most likely to influence group interaction processes with respect to the use of information technology. These are:

1. structural characteristics of the group (group type, composition, and task design and interdependence)
2. non-structural devices of the group (interpersonal understanding and psychological safety), and
3. software experience of the members of the group.

Structural characteristics of the groups

We label as a group any form of collaborative unit that includes three or more employees engaged in a common task and performing it through a system.

Organisations use a variety of group types. These types vary across several dimensions, including cross-functional versus single-function, time-limited versus enduring, manager-led versus autonomous. Hackman's book (1990), for example, organises the reporting of groups into categories such as service (e.g. delivery) and performing (e.g. symphonic) teams. There are different types of groups based on their

functional applications: ‘flight crews”, computer assisted teams, problem solving teams (Guzzo and Dickson, 1996); advice and involvement groups, production and service teams, project and development teams, action and negotiation teams (Sundstrom et al., 1990). Therefore, although group learning processes may vary across group types, this should apply across different types of groups.

Members of a group may have different backgrounds, positions, functions, and tasks within the company. They may have different needs and interests (if any!) in the new system, different experiences and attitudes towards collaboration. Finally, and quite probably, members of a group will be remote: working in different locations, departments, or divisions. Therefore, again, although interaction processes may differ in specific group compositions, they should apply across a group with a diverse structure. Seating employees together and calling them a co-operative group does not make them one.

In considering group size, we observe that in the social psychology literature it is generally agreed that performance improves as group size increases until some optimum size is reached. Once group size is increased beyond the optimum, group members become less sensitive in their exploration of different points of view. and tend to adopt more mechanistic group methods (Nunamaker et al., 1991). Benbasat and Lim (1993) have found that an increase in group performance due to technology use was more evident in larger groups than in smaller ones. It is, however, unclear as to what the optimum size might be in the case of a groupware environment.

Allied to group composition is interdependence (Sundstrom et al., 1990; Kagan, 1993; Campion et al., 1996; Jans et al., 1997; Nolinske and Millis, 1999; Karsten, 2003). It is supposed that people are linked with others in such a way that one cannot succeed unless everyone does. It has been defined in a general sense that team members must depend on each other at work (Jans et al., 1997). There must be mutual benefits in the work: our colleagues’ performance benefits us, and our work likewise profits them. Interdependence can be actioned more efficiently in a group; and within every co-operative learning act it is seen as important to stress the establishment of the group task through mutual interdependence goals. Campion et al. (1996) relate interdependence to tasks, goals, and feedback (p.430), while Jans et al. (1997) write about task and outcome interdependence (p.887). Kagan (1993) observes that positive interdependence occurs when there is a positive correlation between the gains of individuals and that of the group. Nolinske and Millis (1999) argue that through careful planning, positive interdependence can be recognised not only by mutual goals, but also through mutual rewards, structured tasks, and interdependent roles. At the same time, interdependence assumes individual accountability and responsibility to eliminate “free riders” and “workhorses”.

Task interdependence in group processes is an important issue in our research because it is framed by a given technology. Consider some various possible working situations: in some cases the technology will not bring any changes, and employees will continue to perform their usual group tasks within a certain community; alternatively, there may be no change in job functionality but people have to start sharing some tasks in producing the end product; or employees are forced to perform new tasks within a stable working community; or they are requested to learn new

tasks and to start working together. Such situations will result in differences in group learning processes when a new system is introduced to the networked users.

There is another aspect of the interdependence construct that is relevant to our study. There is ample evidence that interdependence is a dynamic phenomenon. For example, in her recent study, Karsten (2003) has shown that interdependence is not a fixed construct: it is a repetitive process of creating and reconstructing patterns of action and interaction where two or more employees are mutually dependent on each other (p.438). Interdependence, it is argued, takes various forms with different kinds of mediators. Collaborative information technologies expect to provide support for collaboration and coordination through shared repositories, discussion forums, communication facilities, and information sharing. Karsten's (2003) empirical research on the use of a Lotus Notes application to facilitate interdependence revealed the complex dynamic relationship between emerging collaboration and information technology. In this way, one can move away from the idea of causal relationships between IT and collaboration, and look for the development of interdependencies between those employees using the technology.

So far, we have considered the following group *structural devices*: composition, task design, and task interdependence.

Non-structural devices of the group

The literature search has directed us towards two features: *interpersonal understanding* and *psychological safety*.

Interpersonal understanding reflects team-mates understanding each other's concerns, preferences, tendencies, and strengths (Druskat and Kayes, 2000). In groups with a high level of interpersonal understanding, members have a clear sense of knowing each other and can predict one another's thoughts and behaviour (Cannon-Bowers et al., 1995). Similar variables can be found in other research: personal relationships (Kinney and Panko, 1996), and awareness of team-mates' characteristics (again, Cannon-Bowers et al., 1995). Kinney and Panko (1996) studied 165 project teams working with Decision Support Systems and concluded that knowledge about team-mates' characteristics effectively affected interaction and allowed the teams to take advantages of individual member strengths. Druskat and Kayes (2000) studied 26 short-term project teams and found that interpersonal understanding predicted team learning and team performance, and they concluded that "spending time focusing on becoming familiar with one another can have a positive impact in groups" (Druskat and Kayes, 2000, p. 345).

Allied to interpersonal understanding is psychological safety in groups. This is defined as a "shared belief about the consequences of interpersonal risk-taking" (Edmondson, 1999, p.375). Often this belief can be tacit, taken for granted and not given direct attention, or implicit in the norms of a working group. The construct implies that the group will not embarrass, reject, or punish someone for speaking out. Psychological safety differs from group cohesiveness, since the latter, it is argued, can reduce the willingness of group members to disagree or provoke difficult discussions. Psychological safety implies an acceptance by all parties of open discussions.

Edmondson (1999) identifies interpersonal trust and mutual respect as important characteristics of group safety that enable team-mates to feel comfortable being themselves.

Trust has long been discussed in the literature. It is understood as the expectation that group members' future actions will meet their commitments to each other in the group (Mayer and Davis, 1995; Nelson and Cooprider, 1996). The study of Nelson and Cooprider (1996) has shown that mutual trust leads to shared knowledge and to increased communication. By repeatedly working together, a group develops a mutual trust that becomes a predictor of shared knowledge (Nelson and Cooprider, 1996). The study of Edmondson (1999) has showed that psychological safety was the most significant predictor of activities such as seeking feedback, experimenting, and discussing errors.

Software experience of the group

Software experience–these are characteristics which may give support in making meaning of a system. Such issues are mainly related to computer literacy, or general software skills.

There is conflicting evidence as to whether prior knowledge and skills in software use has any effect or "contribution" to the process of technology implementation. This point is linked with the necessity to provide special training before implementation, or alternatively to consciously "throw" the technology at the users. Grudin (1994) indicates that a lack of training slows implementation. Conversely, a lack of training and experience was not cited as a barrier to groupware implementation in an e-mail survey of 278 installations (Butterfield et al., 1993).

The evidence from the conflicting findings is that prior experience and skills by the users, or early investments in training, may assist IT implementation but that probably there will be a need for this to be accompanied by careful recognition of other individual characteristics such as active involvement in operating with groupware.

Concluding remarks: feedback to the interim research model

We have depicted only those group characteristics which are, in our view, important in initiating group interaction processes and, therefore, relevant to this research. We have discussed structural and non-structural group features, and also software experience. In conceptualising group learning in IT implementation, we will focus on such group characteristics as composition, task design, and interdependency; interpersonal understanding and psychological safety; and software experience.

Figure 2.7 represents the current state of the interim research model.

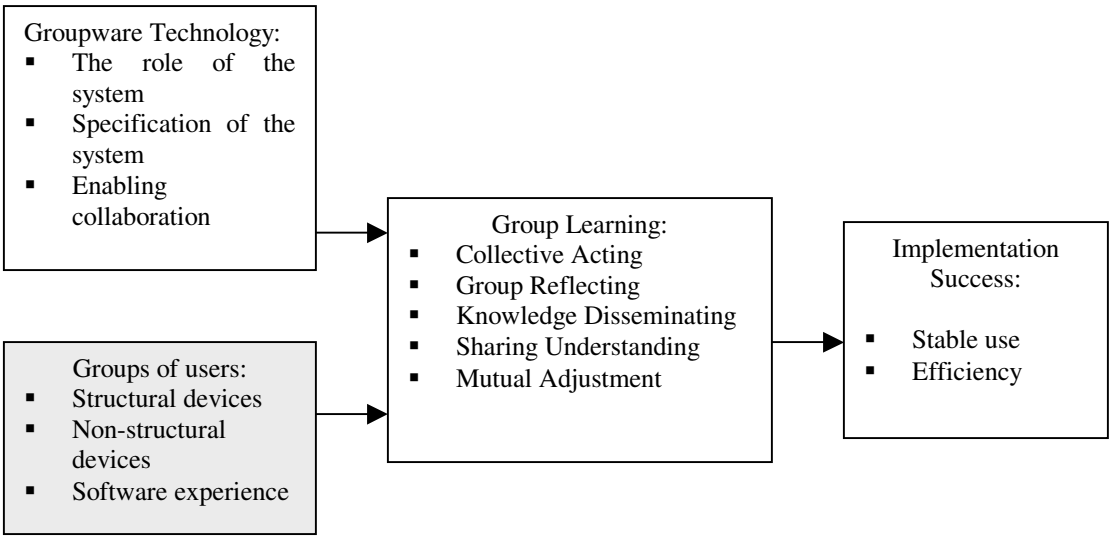


Figure 2.7. Interim research model–5: Implementation of groupware through group learning

We presently assume that features of groupware will influence the characteristics of user groups rather than having a direct impact on the group learning processes. We will retain this view in the preliminary research model and evaluate it in the later case studies.

2.6.2 Managerial support issues

This section discusses the second contextual construct–managerial support issues. These are *organisational arrangements and managerial behavioural patterns in technology implementation that are aimed at encouraging the use of the system*.

A review of the relevant literature has yielded a wide range of managerial tactics and practices that could support IT implementations. Many of the most recent studies consider the implementation of IT projects, especially large IT projects, as synonymous to the management of change in an organisation. In a comprehensive review, Sauer (1999) discussed 12 so-called factor classes that were dominant in the IT literature as potential causes of failure if ignored:

- User involvement (user participation, user communication, user acceptance, user commitment),
- Management commitment (management support, management style, management decisions, management understanding),
- Value basis (users who felt needed, who benefits, relevance of output, output accuracy),
- Mutual understanding (user-developer understanding, technical and economic orientation of designers, designer self-image, lack of understanding of human aspects),

- Design quality (technical quality, technical characteristics, complexity, interface, task compatibility),
- Performance level (system performance, project performance),
- Project management (project objectives, priorities, lack of planning, poor estimates, unclear scope, evaluation difficulties, scale),
- Resource adequacy (time, funds, control, HR quality, selection, training),
- Situational stability (industrial relations problems, change in requirements, informal user organisation),
- Management process (funding process, controlling process),
- Implementation process (poor change management, user requirements not known, specifications not complete),
- Individual differences (personal factors, cognitive style).

Considering the overview of Sauer (1999), it would appear that many IT studies focus on only one or two factor classes and overlook the multifaceted integrated managerial support needed in IT implementation. Recently, however, there are interesting research ideas covering integrated concepts that incorporate managerial practices such as HR tactics, political support, technical resources, and traditional project practices.

For example, the study by Vadapalli and Mone (2000) on integrated user participation structures in IT projects has identified the impact of various organisation behaviours and HR management issues on the steering of IT projects. Their field research in the form of nine case studies investigated the importance of five practices: group composition including size, time, hierarchy, functions; empowerment including users' responsibilities, flexibility in decision making, freedom in defining assignments; evaluation/rewards including focussing on group results, team behaviour, recognition, adequacy of reward systems; training including adequacy of training programmes in terms of their duration, depth, and breadth of coverage; and growth/development including the extent to which career plans were planned for the group members and the extent to which career plans were communicated to group members (Vadapalli and Mone, 2000, p. 138–139). The results of their research revealed that the success of IT projects was mainly influenced by group composition and empowerment, while the lack of rewards, growth, and training did not seem to inhibit success. Relevant to our research is the fact that two influential variables emerged during their investigation: one was the interaction within the group, and the other was the interaction between the group and the steering committee and project champions (ibid. p. 146).

Another relevant example of investigating multiple managerial tactics is the study by Mumford (2000), in which she proposed taking into account the individual, the group, the organisation, and the environmental interventions. The study discusses managerial practices for an innovation project, but not explicitly for an IT project. However, it is worth mentioning because it proposes 34 integrated managerial practices. Examples of the propositions for individual interventions are–selecting for breadth and depth of expertise, defining job expectations, periodically reviewing work progress, providing training; for group interventions–electing leaders based on management skills, providing managers with training, conducting climate surveys; for organisational interventions–developing rotational assignment programmes, providing group interactions, developing recruitment policies, promoting high performance workplace

policies; and for environmental interventions–assessing the implications of strategic changes on expertise requirements, monitoring work force capabilities and expertise. The potential value of these propositions to our research is that they call for a reconsideration of traditional IT projects practices that only 'allow' HR specialists to support an IT project. Rather, Mumford (2000) proposes that HR practices in innovation projects should include a directive, strategic element, and this is therefore relevant to the implementation of new IT.

The recent research by Kuruppuarachchi et al. (2002) also suggests an integrated approach to management support in IT implementation. They incorporate concepts from the traditional project management, change management, and organisational innovation fields in order to formulate management support issues for IT implementation. In their article they propose such organisational practices as clarifying the goals of the project, thorough project plans, user participation, effective communication, skilled personnel, technical expertise, work environment, project sponsoring, decision process, and project monitoring and control.

From the range of management issues in IT projects, we should probably focus on those that support group interaction processes. As a general rule, the use of a new technology by targeted employees should be valued, encouraged, rewarded, and expected by those who are responsible for the implementation project (Wolfe, 1994). In a multiple case study, combining qualitative and quantitative methods, Nutt (1986) found that implementation by intervention, in which leaders became protagonists by creating rationales for action in the minds of key people, was a more effective implementation tactic than the other three tactics he studied (implementation by participation, by persuasion, and by edict) (p.242). The more committed that managers are to technology implementation, the more likely they are to invest in and to monitor the quality of implementation policies and practices (Klein and Sorra, 1996).

We have chosen the concept developed by Klein et al. (2001) since this integrates the multiple implementation policies and also highlights the collective influence of the managerial practices in innovation implementation. They propose considering managerial support as a three-dimensional construct covering: (1) ensuring employees' skills in the use of an innovation; (2) encouraging the use of an innovation; and (3) removing obstacles to innovation use.

We will specify all these dimensions in the implementation of groupware as follows:

- the targeted users are given autonomy and responsibility for decision-making, planning, and experimenting in the use of ICT (ensuring employees' skills);
- the targeted users are provided with various learning opportunities, and formal and informal information resources are available(ensuring employees' skills);
- the learning and use of the system is rewarded, given feedback, and recognised (encouraging the use of an innovation);
- the employees are given sufficient time to take advantage of opportunities to learn the system effectively (removing obstacles to innovation use);
- the management is willing to cooperate and help (removing obstacles to innovation use).

In this section, we have considered the literature on innovation and project management in order to specify the managerial tactics that seem likely to support

group interaction processes in groupware implementation. These are included into the preliminary research model in the following section.

2.7 PRELIMINARY RESEARCH MODEL AND RESEARCH QUESTIONS

As we discussed in the introductory chapter, our main research question is

What is the role of group learning in the implementation of groupware by groups of users from its technical installation until its successful use?

In order to answer this overall research question, we will break it down into three components. As we have seen earlier, group learning includes a range of processes carried out by the users: practicing with the system and discussing this experience, asking for help, clarifying difficulties, talking about errors while working with it, and planning further implementation. This means that we should first clarify which concrete group learning processes might influence groupware implementation. Therefore our first sub-question is:

1. What kinds of group learning processes influence groupware implementation?

IT projects are not always successful, and sometimes experience difficulties that lead to unpredicted failures or delays. In our research, we start with the view that users can and do enact changes in groupware through together developing interpretive schemes and group learning. Next, it is therefore important to establish:

2. To what extent does group learning contribute to the success of groupware implementation?

While we credit success or failure in adoption to differences in group learning, as discussed in the theoretical chapter, we also realise the importance of organisational conditions for these processes. For this reason, we have developed a theoretical construct of managerial support for groupware implementation which we will later further refine. Our third question can therefore be formulated as:

3. What kind of managerial support is needed to stimulate such group learning processes?

In our preliminary model, we have outlined the possible associations between the various constructs as shown in Figure 2.8.

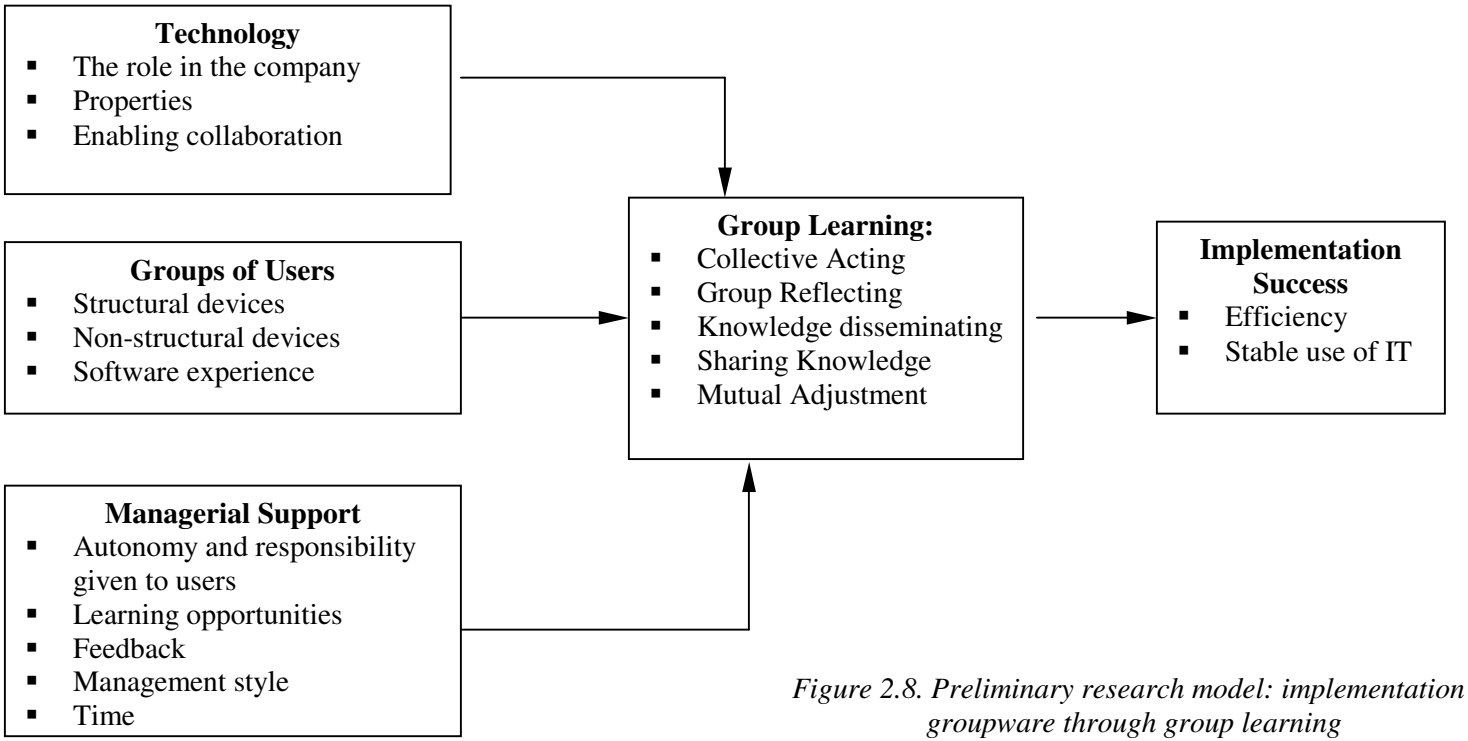


Figure 2.8. Preliminary research model: implementation of groupware through group learning

3. RESEARCH METHODOLOGY: DISCOURSE ANALYSIS

"It is written: "In the beginning was the Word!"
… It is impossible to put such trust in the Word!
I must translate some other way
… It is written: "In the beginning was the Thought!"
Faust's Study

Goether's Faust, an English translation by R. Jarrel (1959, p.61)

In the previous chapter, we looked at the literature and developed a preliminary research model or, more accurately, a cognitive map including the various constructs and dimensions: technology characteristics, managerial support, group features, group learning, and stable use of technology.

Now we will introduce our research method which we believe will advance the aim of the study–understanding how people constitute their work with a newly introduced information technology. The term "method" is normally associated with a research pathway: from assumptions or standpoints to conclusions by selecting a certain collection of experiences.

It is recognised, however, that research methods are not isolated in space, but are related to the research questions and theoretical conjectures stated by a researcher: whether he/she is searching for the 'embedded pictures' in social reality or looking for a description of the patterns, figures and outlines that define the larger scale objects in the reality.

> "There is a painting by Pierre Renoir of the Pont Neuf bridge in Paris in 1872. The immediate impression of it is of people and horse-drawn carriages crossing the bridge. On both sides of the bridge the Seine is visible and the sky and the buildings along the bank of the river provide the backdrop. However, when viewed with a searching mind, one begins to see the outline of a man's face embedded in a picture. Thus two levels of communication are enacted through Renoir's painting: the general Parisian scene and the personal feeling expressed in the face of a man…" (Remenyi et al., 1998, p.95).

3.1 FROM THE PRELIMINARY RESEARCH MODEL – TOWARDS METHODOLOGY

In our study, we strive to understand the "embedded pictures"–how end-users construct their work with information technology. In other words, we aim to reveal the social context and its origins that are incorporated in people's tacit understandings of information technology. We are concerned to understand the social phenomenon (IT

implementation) by attempting to answer such questions as 'What?' 'Why?' and 'How?' rather than 'How many?' or 'How much?'

Therefore, our *first methodological choice* is made in favour of an interpretive approach. Our research is based on the idea that the human mind creates the meaning of social reality, and more specifically the implementation of information technologies. This approach fully corresponds with the theory of experiential learning as applied to IT implementation. Constructivism as a theory of learning in our research represents the idea that learners–users of the systems–do not merely accept a truth about technologies from the managers and project leaders, but actively construct an implementation process through their learning experience. This approach emphasises collaboration, which is always constructivist because it stresses communication as the key factor in the creation of reality.

It should be noted that this interpretivism in IT studies has emerged from within the soft studies described in the previous theoretical chapter.

The predominance of positivism among pre-1990s IT studies was recorded by Orlikowski and Baroudi (1991) who noted that 96.8 per cent of all published IT articles in their sample were positivist, with the rest being interpretive. IT studies before the 1990s were dominated by 'universal' relationships between variables in the social reality (see also overviews by DeSanctis and Poole 1994, Robey and Boudreau 1999).

However, since the 1990s, 'new' streams have exploded in the IT field with the view that IT implementation is a dynamic process. Since then, there have been signs of increasing acceptance of the idea that multiple perspectives in the exploration of a dynamic implementation require multiple and dynamic research methods (Walsham, 1995: Klein and Myers, 1999: Mingers, 2001: Orlikowski and Barley, 2001; Schultze and Leidner, 2002; Wynn et al. 2002).

The following criteria to be met in interpretive studies were outlined by Orlikowski and Baroudi (1991): the object had to be examined from the perspective of the participants; analysed within a specific and detailed cultural and contextual perspective; outcomes had to be regarded as non-deterministic, and that the complex interactions and interpretations of individuals and groups were seen to result in heterogeneous resultant systems.

Klein and Myers (1999) have developed further criteria for an interpretive IT study. Such a study should: be based on the assumption that knowledge is gained only through social constructions, focus on the complexity of human sense making as the situation emerges instead of predefining dependent and independent variables, and attempt to understand phenomena through the meanings that people assign to them. The following principles were recognised as important for interpretive studies (Klein and Myers 1999, p.72-77):

- the fundamental principle of the hermeneutic circle which is, in effect, a meta-principle upon which the others expand. This suggests that researchers should come to understand a complex whole from preconceptions about the meanings of its parts and their interrelationships;

- the conceptualisation principle requires the subject matter be set in its social context. A researcher should seek to understand a moving target because they see organisations as constantly changing relationships between people, organisations, and technologies;
- the principle of interaction between the researcher and the subjects requires the researcher to place himself and the subjects in a historical context. The participants in the research are seen as interpreters themselves because they alter their horizons by the appropriation of concepts used by the researchers;
- the principle of abstraction and generalisation emphasises that the particulars can be conceptualised to a very abstract level and that unique instances can be related to ideas and concepts that apply to multiple situations. However, this does not mean that theories have to be tested in a direct manner but rather that theoretical abstractions should be carefully related to the case study details so that a reader can follow how the researcher reached their conclusions;
- the principle of dialogical reasoning requires sensitivity to the contradictions between the research preconceptions and the data that emerge through the research process. In contrast to the positivist tradition, an interpretive investigation recognises that prejudices are a necessary part of the starting point for understanding, and that the critical task becomes one of distinguishing between true and false presumptions;
- the principle of multiple interpretations requires the researcher to examine the influences of the social context upon the actions under investigation. It emphasises that the researcher should confront contradictory interpretations among the participants.

These principles are interrelated with the "whole" they create, and therefore the "whole" (the final published story) affects the parts (how each of the principles was applied). For this reason, Klein and Myers (1999, p. 78) stressed that these principles are not like bureaucratic rules of conduct, and that the application of them still requires considerable creative thought. They should not, however, be used *à la carte*, and none should be left out arbitrarily, but rather they should be carefully considered and used in every particular investigation.

Understanding, interpreting, conceptualising, critical reflecting, and historical grounding are standpoints that have gained increased value in IT research during the last decade. "Research methods can be seen as instruments for provoking a response from the world" writes Mingers (2001, p.242) "the nature of the response depends on both the world and the instrument".

The *second methodological choice* is made for case study research within the interpretive approach. We see three reasons why case study research is a viable strategy for our study. First, we have to investigate IT implementation in a natural setting, learn about the state of the art, and improve our understanding of it. Secondly, the case method allows us to study the real life dynamism of IT implementation, and to observe the complexity of IT projects in organisations. Thirdly, a case approach is an appropriate way to research IT implementation since the boundaries between the organisational context and the phenomenon itself are not clearly evident. There are some crucial differences between positivist case studies (Lee, 1989; Yin, 1993) and interpretive case studies (Miles and Huberman, 1994). These differences stem from

the fundamentals of two paradigms–positivism and interpretivism. An interpretive case study should meet the interpretive principles that we discussed earlier. Some common characteristics of case study research can be summarised from the works by Eisenhardt (1989), Yin (1993), Stake (1994), and Miles and Huberman (1994):

- a phenomenon is studied in a natural setting.
- Data are collected from one or a few entities (person, group).
- The complexity of phenomena is examined intensively.
- Changes in site selection and data collection methods may take place during the investigation process.
- The focus is on contemporary events.

Our *third methodological choice* is the selection of qualitative methods within a case study approach. The motivation for doing qualitative research, as opposed to quantitative, stems from the observation that if there is one thing which distinguishes humans from the natural world, it is the ability to talk. We believe that qualitative methods will help us to understand the meanings that people assign to technology and the process "where the information system influences and is influenced by the social context" (Walsham, 1995, p.5-6). Language as a social construction will mediate our understanding of the meanings and knowledge that are assigned to IT by people. From the large range of qualitative methods, we need to specify and justify the method chosen for our research.

3.1.1 Proceeding towards a new method

Our research starts with people, and explores how they develop their work with a system through group learning. We have discussed that employees create their own understandings and perceptions of IT through group learning, or interactional processes that occur in groups of users. However, such processes have been, so far, overlooked in most IT studies. Therefore, we need to search for a research method that is different from those traditionally used, and provides us with a strong means to support theory building from users' understandings and perceptions of the technology.

Interactional processes 'provoke' users to start to interpret technology and make sense of it. This sense-making process is not static: employees continually develop their understandings of IT, and this leads to continuing development of their use of technology. Therefore, in our view, it is rather difficult and illogical to study IT implementation as if it were a fixed material object. There is an on-going interplay between the content and the context of IT implementation that is reflected in the language of organisations. This requires the stories, narratives, symbols, and expressions–i.e. the discourses–that together grasp the dynamic and sometimes contradictory developments of technology implementation. These stories and expressions reflect how employees and managers work with the technology, which is why it is important to articulate them. However, the spoken or written discourse always lags behind what one wants to say and, if you are to really understand what was said, you have to derive this from the inner speech lurking behind it.

It means that our research method should, in the first place, be different from traditional ones; secondly, it should provide us with a powerful model to cover the

dynamic interplay between "content" and "context" in IT implementation; and thirdly, it should provide the opportunity to conceptualise the assumptions of the users themselves embedded in their discourse on IT implementation.

This is why our empirical research will focus on collecting and analysing data that holds elaborated statements, speeches, news, reports, announcements, expressions, idioms, and sayings. All of these are related to the information and understandings, assumptions, perceptions, attitudes, opinions, and awareness of employees about a newly introduced IT in a company. In short, we will conduct empirical research by means of *discourse analysis.* We shall talk about the power of incomplete and ambiguous, contradictory and double-edged discourses that constitute the implementation of technology that users experience as solid and real.

We see that there have already been attempts to apply discourse analysis to IT research (e.g., Heracleous and Barret, 2001). Although the traditional social sciences have actively been using the method since the 1980s, IT research has only recently undertaken the first steps in its employment. Thus, the *Call for Papers for the IFIP WG8.2 Conference-2002* announced, "over the past 20 years, the field of information technologies has grown dramatically in its theoretical diversity. This growth is reflected in the discourse that policy-makers and organisational stakeholders use when they talk about their IT plans. As IT breaks in further into organisational life, it becomes ever more important to investigate discourse about it". However, so far, discourse-based IT studies lack both a conceptual grounding and the 'route descriptions' needed in the method. One can easily get lost in the diversity of expressions that exemplify the discourse of end-users, managers, and policymakers about IT. We believe that there is a need to elaborate on the theory and the practical use of the method in IT studies.

In discussing the grounds for adopting discourse analysis, we would like to add a personal note. We uncovered this method when others were seemingly unhelpful in our study, and we have been encouraged by the possibilities and the results from what has been done. The procedures we followed became logical steps in the chain of knowledge building in our research. It has taken considerable effort to overcome the difficulties we found in applying discourse analysis to this IT study. By providing a general framework for understanding forms of discourse analysis, and by elaborating on actually *doing* it, we hope to encourage other researchers in the field and save them from having to repeat our struggles.

Through this, we would claim to have developed our view of 'doing' discourse analysis. We will show that the practice of discursive-based research is highly dependent on the theoretical foundations chosen by a scientist. Therefore, we need to lay bare the theoretical basis for discourse analysis in our study. Many researchers in this field elaborate on the theoretical discourse framework, and claim that discourse analysis is both a theory and a method (Van Dijk, 1985; Potter and Wetherell, 1987; Fairclough, 1995; Gill, 1996; Titscher et al., 2000; Wodak, 2001). However, they do not support the *systematic* application of the philosophical origins of the theory of discourse analysis. Consequently, these studies have neglected to produce a framework that bridges the philosophical foundations, the theoretical implications,

and ‘doing’ discourse analysis. We aim to contribute to the existing body of knowledge by developing such a framework and applying it to the IT field.

The origins of discourse analysis belong to the philosophical discussion on hermeneutics that we outline in the next section of this chapter. Following this, we present and discuss the theoretical implications of discourse analysis. The final part of this chapter concentrates on the practical use of the method as developed and applied in this study.

3.2 HERMENEUTICS: INTERPRETATION AND MEANING

Is there a *rule* for interpreting that is unique to social science, and does it have a special *procedure* for understanding? These questions concern the core of hermeneutics, which has long been debated in German philosophy. The philosophical discussion was revitalised in the mid-twentieth century by the publication of Hans-Georg Gadamer’s “Wahrheit und Methode” (“Truth and Method”) in 1960 (English translation in 1975). The core question raised was whether hermeneutics differed from ‘real’ science. Later, this was reformulated to the statement that ‘disciplines of understanding’ distinguish themselves from those of ‘explanation’ by their method, the unique characteristic of which was a particular ‘psychological act’–namely understanding (Gadamer, 1994).

3.2.1 Objective hermeneutics

One of the origins of the hermeneutical interpretations was the Reformation controversy concerning the proper interpretation of religious texts. Connoly and Keutner (1988) note that both parties involved in that controversy–Catholics and Protestants–held that scriptural interpretations are decidable, though they differed over the criterion of decidability. In practice, hermeneutics evolved over the nineteenth century as a reflection on the controversy.

Gadamer (1985) characterises the German hermeneutical philosophy of the nineteenth century as ‘Romantic objectivism’, which also viewed the hermeneutical disciplines as “separate but equal in their difference from the natural science” (p.38). The interpretive goal was to uncover something hidden, but hidden not so much in a text as in the psyche of a writer. However, objective hermeneutics was not constrained to uncovering the author’s intention as the criterion for the correct interpretation. The meaning of the text was supposed to be an objective fact: something that in principle could be discovered once and forever. Thus, interpretation was considered as the process of verifying, or falsifying, and confirming different ‘meaning-hypotheses’. Hermeneutics was certainly romantic as “hardly any authors of the great hermeneutic classics, from Schlegel to Schleiermacher, Böckh, Droysen, and Dilthey, risked allowing their works even to go into print. It is only thanks to their students that their inquiries were transmitted to posterity” (Grondin, 1994, p.63). It is the late works of Wilhelm Dilthey (1833–1911) that many refer to as the bridge to the constructivist

hermeneutics of the twentieth century (for example, the discussion "Dilthey: on the way to Hermeneutics" by Connoly and Keutner, 1988).

Following Dilthey's view, with the meaning of a whole [text] itself determined by the meaning of the parts [words], interpretation would be "an attempt to determine a never ending ["Niezuendekommen"] process, a shift between part and whole" (Gadamer, 1985). This idea was the first bridge to the 'new' hermeneutics: if interpretation is endless, and if its object [text] is constructed during the hermeneutical process, in what sense can we label interpretation as objective? To Connoly and Keutner (1988), with "the notion of the interminability of the hermeneutical process mentioned by Dilthey, another concept of interpretation announced its arrival on the scene" (p.16), namely constructive hermeneutics.

3.2.2 Constructive hermeneutics

We have noted that the hermeneutical tradition until Dilthey was dominated by what was called 'objectivism' about the meaning of texts: texts had a unique meaning that could be determined by the reader. In the twentieth century, a new generation of hermeneutics laid down the foundation for a non-objectivist, or 'constructivist', view of interpretation in the works of Martin Heidegger (1889–1976), Ludwig Wittgenstein (1889–1951), and Hans-Georg Gadamer (1900–2002).

The view is no longer that the true interpretation has simply not yet been found, but rather that there is no such final interpretation. The hermeneutical circle's essence is its openness. Such openness is supported by the concept of "language"–which leads to the 'universality of the hermeneutical problem' (Gadamer, 1975).

> "The appearance of the concept "language" presupposes consciousness of language. But that is only the result of the reflective movement in which the one thinking has reflected out of the unconscious operations of speaking and stands at a distance from himself. The real enigma of language, however, is that we can never really do this completely. Rather all thinking about language is already drawn back into language. We can only think in a language, and just this residing of our thinking in a language is the profound enigma that language presents to thoughts" (Gadamer, 1975, p. 62).

Put more simply–what we state, express, write and/or bring into a dialogue is already a reflection on our 'inner' language or thoughts. Then, how does one understand a 'real intention', what was supposed to be stated? In his opus, *Truth and Method*, Gadamer (1975) develops a concept of understanding. Firstly, the interpreter's place in history is a central issue: "the application of a text is to be always understood in the present situation of the interpreter" (p. 165). An interpreter becomes a mediator between the past and the present meaning. The past in this sense includes every event that took place before an interpreter faces an expression. Understanding, therefore, is an event, a movement in history itself where an interpreter and a text become interdependent.

> "Interpretation is not an occasional additional act subsequent to understanding, but rather understanding is always an interpretation, and hence interpretation is the explicit form of understanding… It is thought as the entering into an event of

> transmission in which past and present are constantly mediated" (Gadamer, 1975, p. 274).

So, understanding is not reconstruction but mediation. Griseri (2002) views the idea of mediation as the translation of the reality into a form which can be made comprehensible by the person who makes the statement. It is modelled in such a way that individuals can make sense of it within their own conceptual framework (p. 135). For example, if we say, "Interviews without protocols are useless", this is not to be taken as a literal prediction. It is no more than a way for us to make sense of our own experiences.

Central to modern hermeneutics is the idea that an interpreter would derive meaning from social events as a translator would from a text written in an unfamiliar language. In so doing, a 'translator' (interpreter) makes a link between the 'text' (social events) and a whole range of previously established interpretations, history, backgrounds, and accounts of what the events mean to different individuals. A statement about social reality becomes a link between this social reality and the person making the statement, and can only be understood in terms of the circumstances in which it is made.

The idea of a hermeneutical circle refers to the dialectic between the understanding of the text as a whole and the interpretation of its parts. The movement of understanding develops constantly from the whole to the parts and back to the whole.

A circle of interpretation is considered as the basis from which a variety of linked events (texts) mutually support the ideas of an interpreter. The proposed belief concerning protocol-free interviews gets, therefore, its meaning within a certain context, in which it becomes clear why that statement was made. Another function of the hermeneutical circle is grasping a social network–understanding phenomena as the community does. In other words, it is broader than simply getting inside an individual's head. This requires synthesising and bridging lots of events. Sources for these events can vary: textual, technological, conversational, including one or more people, etc.

Again returning to Gadamer (1975), the hermeneutic circle is continually open for re-interpretation; concepts are formed and re-formed in such a manner that their universal meaning is required to be integrated within the particular situations in which they can be completed (p. 446). This interminable interpretation experience is familiar to all interpreters: the process of understanding statements (texts, events) *de facto* goes on and on. An important point is that the circle is not 'private', but open to critiques and discussions–inter-subjective examination.

Another aspect of modern hermeneutics is that the concepts do not map the social reality, and in every particular situation there is space for creativity. Fresh examples may bring new aspects; insights may creatively deviate from known practices. The inspiration for this idea derives from Wittgenstein (1953). One cannot map all the concepts in advance–they can change as a matter of course in a changing world. Misunderstandings may naturally occur because of the changes in words, meanings, and worldviews.

3.2.3 Hermeneutics: summing up the discussion

We have characterised as 'hermeneutical objectivism' the view that for any literary text there is in principle one unique interpretation. Further, the Anglo-Saxon nineteenth century approach to interpretation was dominated by the debate on hermeneutical objectivism, or realism. Interpretations were considered as decidable due to the author's or the text's intention.

Modern hermeneutics was inspired by the German non-objectivist view developed in the twentieth century. It is based on constructivist grounds and views interpretations as interminable, or open. Interpretations give a meaning to a text only within a framework of the interpreter's experience, knowledge, time, epoch, culture, and history. Therefore, understanding becomes mediation between the past and the present meaning, and makes events comprehensible through a 'translating' process. The hermeneutics circle allows social events to be connected in one frame in order to support the interpreter's ideas; and grasp a community feeling by representing network understanding.

An interesting question is posed by Griseri (2002). If the hermeneutical circle is open, it seems that there is no room to say what the best available interpretation is. If our interpretations are different from the common and institutionalised ones, which one is preferable? The first answer could be that people cannot cut themselves off from the common interpretation and insist on a 'better' one. Another answer could be related to the inter-subjectivity we mentioned earlier: validity is developed through a dialectical process of using a circle of evidence to create the social reality, and through the openness to other interpretations and critiques (Griseri, 2002).

After all that we have said about hermeneutics, one comment remains: the idea of the hermeneutic circle may be no more than a roundabout way of talking about what is actually done, and what it would be nice to do, in the name of social science. Nevertheless, what is the *body of the process* of the hermeneutical circle? Searching for an answer, one may try to adopt some of the well-known and countless research methods used in the social sciences. Gadamer may have insisted that the approach had its own way of investigating the reality, but the nub is in the details of *how* the circle may operate, or may be applied. Griseri (2002) remarks "hermeneutics seems to be silent on what counts as a sound method of interpretation" (p.141), and continues that the literature on hermeneutics is full of lofty discussions on the nature of social understanding and its everlasting character, but lags behind on such questions as 'what is the destination of this understanding?' and 'what is the criterion of relevance for the texts included in an interpretation?' If one were to assume that all additional materials were relevant then research would collapse. How then to decide what to exclude? Perhaps by consensus–but then we have the problem as to whether the consensus is right or wrong.

Essentially, we accept this criticism: that hermeneutics does not provide us with concrete methods. However, we disagree with the main thrust: we believe that the goal of hermeneutics is to develop a platform from which to start the journey for those who are interested, rather than depicting concrete steps, research protocols, instruments, or procedures. Various research methods have appeared over the history

of the social sciences that can be traced back to hermeneutics, among them discourse analysis.

In the following sections, we will discuss a more tangible application of the hermeneutic circle–discourse analysis. Based upon its roots and general theoretical characteristics, we will attempt to develop practical implications: the concrete procedures on how to *do* discourse analysis, in respect of the hermeneutical framework.

3.3 DISCOURSE ANALYSIS: INTRODUCTION TO THE METHOD

After the philosophical discussion on the hermeneutic circle was largely established and understood, various methods for analysing the constructive role of language arrived on the research agenda, including a discursive-based analysis at the end of the 1970s, (Sinclair and Coulthard, 1975; Van Dijk, 1985; Potter and Wetherell, 1987; Fairclough, 1995; Titscher et al., 2000). However, much of the literature tended to focus on the same institutional settings, and discussed the theoretical antecedents which were still acknowledged as somewhat less than clear (Grant et al., 2001).

There are many explanations and definitions of discourse and discourse analysis. Van Dijk (1997), for example, in his introduction suggested that the entire 700 pages of his two-volume set on discourse could be seen as an "elaborative answer" to the question: *what is discourse?* Although the task is difficult, we need to have a general idea of what we mean by the terms discourse and discourse analysis. Probably, it would also be helpful to outline the differences between discourse analysis and some other qualitative research methods that deal with texts. In this section, we will present some important terms, describe theoretical implications of discourse analysis, show the diversity of approaches, and compare it with some of the other research methods for analysing texts. We need to discuss this in order to clarify our research 'place' within the diversity of discourse analysis applications, to elaborate on the quality criteria for 'doing' it, and build a framework for practice. After four further subsections, the fifth provides a synopsis of our insights into discourse analysis.

3.3.1 Defining our terms

An early view of discourse saw it as a form of spoken dialogue and in contrast to written texts (Sinclair and Coulthard, 1975). A later image of discourse was as a combination of both spoken and written texts, which allowed one to describe discourse as "all forms of spoken interaction, and written texts of all kinds" (Potter and Wetherell, 1987, p.7). Such definitions focused on discourse as the study of language, and many discursive works adopt such a perspective. Later developments have brought new insights. Discourse was referred to as the practices of talking and writing (Woodila, 1998) which bring objects into being through the production, dissemination, and consumption of texts (Hardy, 2001).

In our research we will follow the definition given by Hardy (2001) and view *discourse* as "a system of texts that brings objects into being" (p.26). The goal of the

discourse analyst, therefore, is to explore the relationship between discourse and reality, interpret a hidden meaning, and mediate between the past and the present. In this way, discourse analysis is a particular methodology that tries to "understand the process whereby reality comes into being, rather than simply examine how actors make sense of pre-existing reality" (Hardy, 2004, p. 416).

The concrete representation of discourses is *texts*, or discursive 'units' (Chalaby, 1996). They may have a variety of forms: formal written records–such as news information, company statements and reports, and academic papers; spoken words–pictures, symbols, artefacts, transcripts of social interactions such as conversations, focus group discussions, and individual interviews; or involve media such as TV programmes, advertisements, magazines, and novels. In fact, texts can be seen as depositories of discourses: they 'store' complex social meanings produced in a particular historical situation that involved the individual producer of a text unit.

Texts are almost irrelevant if taken individually (recall our example of the statement about 'protocol free' interviews). It is only their interconnections that make discourse analysis valuable. Discursive activity does not occur in a vacuum, and discourse itself does not hold a meaning. Accordingly, if we are to understand discourse, we must also understand the *context* in which it arises (Van Dijk, 1997; Titscher et al., 2000). Researchers usually distinguish two types of context: broad and local (Titscher et al., 2000; Grant et al., 2001). A more detailed classification of the extent of a context involved in a study also exists (Alvesson and Karreman, 2000) covering: micro-discourse (specific study of language), meso-discourse (still the study of a language but with a broader perspective), grand discourse (study of a system of discourses that are integrated in a particular theme such as culture), and mega-discourse (referring to a certain phenomenon such as globalisation).

An exploration of the interplay between discourse, text, and context builds the focus of the discourse analysis. Recognising the importance of texts, sets of texts, and context moves discourse analysis beyond other methods of textual analysis. Instead of focusing only on what people say or write, the focus is on their interplay and on how this supports shaping organisational reality. To show that texts or discourses alone are insufficient to understand organisational life, we adapt the categorisation of textual agencies established by Cooren (2004) (based on the work of Searle, 1979) and demonstrate what texts and discourses can *perform*. The framework includes five categories of textual agencies: assertives, commissives, directives, declarations, and expressives (Table 3.1). It becomes apparent that, in order to better understand organisational life, it is wise to study both texts and discourses.

	Domain of texts (verbs)	Domain of discourse (verbs)
Assertives	Inform, confirm, indicate, say, assert, deny, bemoan, suggest, announce, predict, tell, remind, attest, certify, contradict, refute, critique, contest, question, accuse, denounce, proclaim.	Confess, pride oneself, boast, brag, accuse, contradict.
Commisives	Commit, promise, guarantee, vouch, assure, threaten.	Swear, accept, agree, consent, refuse, bet.

Directives	Request, advise, ask, invite, suggest, recommend, warn, notify, summon, press, compel, solicit, demand, forbid, ban, authorise.	Beg, supplicate, implore, beseech, entreat.
Declarations	Declare, dismiss, revoke, approve, confirm, sanction, ratify, legalise, homologate, bless, condemn, commute, pardon, reprieve, exculpate, absolve, postpone, adjourn, endorse.	Renounce, relinquish, repudiate, abjure, abdicate, capitulate, disown, consecrate, curse, damn, open, close, retract, auction, award, nominate.
Expressives	Compliment.	Thank, apologise, congratulate, condole, complain, boo.

Table 3.1. Illustrations of the actions that texts and discourses can perform (adapted from Cooren, 2004)

Although the division of verbs between texts and discourses (Cooren, 2004) is probably not complete, and some verbs could even be 'transferable', the importance is that this acknowledges that both individual texts and discourses contribute to making organisational forms. Therefore, we must observe selections from the texts that embody discourses. We should not simply concentrate on an individual text, but on a set of them. Further, we must refer to the concrete bodies of the texts and investigate the ways that texts such as reports, contracts, memos, signs, announcements, and work orders *perform something*. Similarly, we should examine the context in which the texts were found and the discourses produced.

3.3.2 A theory and a method

Although we have defined a discourse and discourse analysis, it is too soon to jump to the practical implications. We will show that how one 'does' a discourse analysis is based upon the theoretical grounds of the chosen method, for example a linguistic discourse analysis is different from a socio-psychological discourse analysis. Therefore, the clarification of a theory is the first, necessary step in realising how to apply the approach.

The process starts from the fundamental assumptions derived from hermeneutics: that language is a medium oriented towards action and function, that people use language intentionally to construct accounts, or versions, of the social world (Elliot, 1996); and that one-to-one correspondence exists between a word (encoding of information) and its meaning (decoding of information) within a certain context (Zajacova, 2002).

Three themes in discourse analysis can be distinguished as different research foci. The first theme is that language is constructive and used to construct the social world rather than being a transparent medium of it (Potter and Wetherell, 1987). Discourse is manufactured out of pre-existing linguistic resources. Thus, this 'manufacturing' already implies a choice from a number of possibilities. Even a simple construct can be described in multiple ways, and every description will depend on the orientation of

the speaker and the reader. And finally, in a very real sense, texts of various kinds construct the social world.

A second theme is the discourse itself, or the texts in their own right, without assumptions about some 'meaning' behind the text.

A third theme is concerned with the practical orientation of discourse–its occurrence in a particular interpretive context (Gill, 1996). The focus on the language function is a major component of discourse analysis. Function, however, is not to be understood mechanically. We do accept or challenge, persuade or dissuade, ignore or notice, excuse or blame, accept or reject, etc.–and not always explicitly. It may be to a speaker's advantage, for example, to make a request implicitly because it gives the recipient the opportunity likewise to reject in an implicit way. Thus, the analysis of function is more complex, involving the contextual and historical knowledge mastered by the interpreter. A simple textual unit may cover the desire of a person to present themselves in a favourable light, while someone they dislike in a poor light (Potter and Wetherell, 1987). In addition, every text unit may have several 'functional' intentions. In general, discourse analysis proposes that the use of language is more variable in its constructive function than a simple description.

There are various analytical approaches applied in the above-mentioned themes. As Gill (1996) has noted, "it is much easier to explicate the central tenets of discourse analysis than it is to explain how actually to go about analysing discourse" (p. 143). In approaching this, one walks through a 'recipe book' of prescribed phases, or attempts to follow an unstructured, seemingly mysterious path. The design of the approach, in our view, is dependent upon the researcher's world view and the specific goals of the project, which can vary from a fine-grained study of linguistic features (Van Dijk, 1985) to the dominant themes in the respondents' discourses. Researchers agree that the methodology of discourse analysis "can only be presented with reference to particular approaches" (Titscher et al., 2000, p. 144). Any approach, however, demands that researchers shift from seeing discourse as reflecting social reality, to examining the ways in which accounts are constructed and the functions they perform.

Given such diversity, what should be the quality criteria for discourse analysis? We would argue that the discourse analysis "must be intelligible in its interpretations and explanations" (Titscher et al., 2000, p.164) which leads to trustworthiness in a study (Lincoln and Guba, 1985). The process of collecting, analysing, and explaining data must be recognisable and transparent. Van Dijk suggests accessibility as a criterion for quality: findings should be at least accessible and readable by the social group under investigation. This equates to the member check proposed by Lincoln and Guba (1985) for qualitative studies. Triangulation techniques can also be used to enrich trustworthiness by employing a variety of background information, empirical data, and analysing techniques (Wodak, 2001).

Further, and very specifically for discourse analysis, the value of findings and conclusions is anchored in the inter-subjective validity; this being the endless openness and interchange among different types of data, participants' and researcher's interventions, interpretations and explanations, and diverse levels of analysis (individual vs. a combination of texts, linguistic vs. context).

3.3.3 Mapping diversity

Now we should look at the diversity of the research in this field. The goal of this section is to map this diversity in order to understand our own perspective.

There are many approaches that encompass discourse analysis, and the challenge is to make sense of this diversity (see for example, the proceedings of the series of international workshops on Multidisciplinary Approaches to Discourse, Degand et al., 2001). In terms of disciplines, empirical discourse research can be found right across the social sciences, in health sciences, business studies, education, sociology, anthropology, political studies, computer science, and elesewhere. Some researchers have chosen to identify themselves as members of the new discipline of discourse analysis and have established a new interdisciplinary field (see the journals *Discourse and Society* and *Discourse Studies*, edited by Van Dijk, 1985).

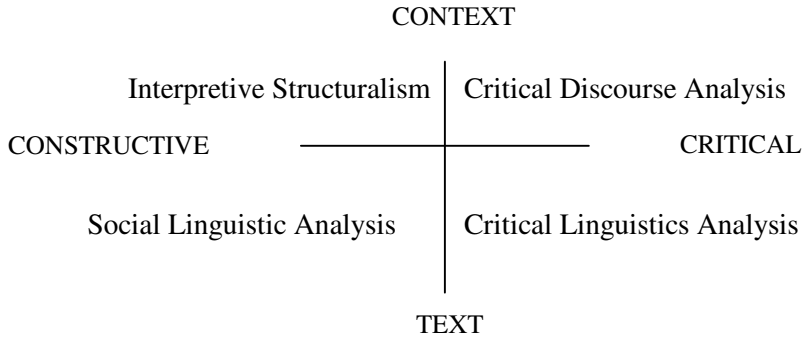


Figure 3.1. Approaches to Discourse Analysis (Phillips and Hardy, 2002)

Phillips and Hardy (2002) categorise the empirical discourse studies along two key theoretical dimensions. The first dimension concerns the importance of text versus context in the research. The second dimension concerns the extent to which "power dynamics forms the focus of the research–more critical studies versus more constructive studies" (p.19). Figure 3.1 illustrates these two dimensions.

The vertical axis shows the range between text and context, which may seem surprising given our discussion on the importance of historical, cultural, and contextual knowledge for hermeneutic studies, and in particular for discourse studies. In conducting research, one has to choose which data to select–no researcher can study everything. Whereas the local context is always relevant (Wetherell et al., 2001), the broader social context may be included depending upon the interest of the interpreter. In other words, the close context is always incorporated in one way or another, but the broad context remains optional. The 'scale' from text to context can be equated to micro- to mega- discourse as discussed earlier (Alvesson and Karreman, 2000).

The horizontal axis shows the continuum between constructive and critical approaches. Constructive-based studies are focused mainly on exploring the way in which social events are constructed. Critical studies focus more explicitly on the dynamics of power, knowledge, and ideology that surround discursive processes. Again, this is a matter of choice and degree as constructivist studies are also sensitive to questions of power.

By combining the two axes, four perspectives have been identified: social linguistic analysis, interpretive structuralism, critical discourse analysis, and critical linguistic analysis (Phillips and Hardy, 2002).

Social linguistic analysis is constructive and text-based. Many studies talk about specific social situations and examine texts and verbal segments from recorded interviews, conversations, participatory observations, stories, and focus groups. The goal of such analysis is to conduct a close reading of the text through standard approaches such as conversation analysis (e.g., Wooffitt, 2001), literary analysis, rhetorical analysis (Mauws, 2000), and the micro-discourse analysis usually carried out in social psychology (Potter and Wetherell, 1987). To exemplify social linguistic research we refer to one study–an exploration into the ways of decision taking on proposals submitted to a Film Corporation by musicians seeking financial assistance (Mauws, 2000).

Interpretive structuralism focuses on the analysis of the social context and the discourse that supports it. Although texts may provide some of the data, the description of the context relies on additional insights obtained from the interviews, archives, and other materials. After texts have been collected and analysed, they may become even more important as background material because the study aims to interpret the context, i.e. to provide a broader picture rather than just a microanalysis of individual texts. As with social linguistic analysis, the prime concern is the way in which broader discursive contexts are constructed, but without a direct concern with power. In fact, many organisational studies use this type of discourse analysis. A good example is a study of organisational change in a high-technology research company through an examination of the storytelling used by managers (O'Connor, 1995).

Critical discourse analysis focuses mainly on the role of discursive activity in constituting power relationships (Fairclough, 1995). It has a particular interest in the relationships between language and power, and therefore the critical discourse and critical linguistic approaches to analysis are often seen as equal. However, there are some differences.

> "Unlike other discourse analysts, critical discourse analysts (should) take an explicit socio-political stance: they spell out their point of view, perspectives, principles and aims, both within their discipline and within society at large. Although not in each stage of theory formation and analysis, their work is admittedly and ultimately political. Their critical targets are the power elites that enact, sustain, legitimate, condone or ignore social inequality and injustice. That is, one of the criteria of their work is solidarity with those who need it most" (Van Dijk, 1993, p. 252).

To illustrate appropriate topics for a critical discourse study we give two examples: Phillips and Hardy's (2002) work showed the differences in the rights to speak between different groups of refugees; and the work of Lutz and Collins (1993)

focused on the role of National Geographic in shaping American understanding of non-Western cultures in the United States.

Critical linguistic analysis focuses on individual texts, but with a strong interest in the dynamics of power that surround the text. Individual pieces of texts are examined to understand how the structures of local or broad context are embedded in the text. An illustrative example of a critical linguistic study is the work of Garnsey and Rees (1996), who examined discourse on women's opportunities in business using linguistic techniques.

In summarising this section, we note that although there are other categorisations of discourse studies, the frame shown in Figure 3.1 does provide a relevant and comprehensive tool for understanding the diversity.

This framework is helpful in understanding our own perspective. We intend to focus on the analysis of the social events (implementation of IT through group learning) and context in an organisational reality, and examine how discourse analysis can support our research goals. Using the microanalysis of texts as a starting point, we will progress to interpret the whole context. Therefore, our discourse analysis will be located in the interpretive structuralism quadrant in the scheme by Phillips and Hardy (2002).

In re-reading the previous sentence, it becomes clear how far we still are from the promised concrete steps and procedures for carrying out discourse analysis. However, there is one further theoretical aspect left that will bridge the chasm between theory and practice. In the next section, we will present our comparative examination of various methods for analysing texts. This discussion will bring us one step closer to the practice of discourse study, by showing up the differences to other methods.

3.3.4 A comparison with other methods of text analysis

As with all research techniques, methods for text analysis are developed within a certain discipline and have social relationships within scientific networks. Therefore, from across the broad spectrum, we have chosen those methods of text analysis that are frequently used in IT research: content analysis, ethnographic text analysis, narrative semiotics, and grounded theory techniques. We add to this list discourse analysis and compare it with the others.

Before describing the selected methods, it should be pointed that two of them–content analysis and narrative semiotics–are 'real' linguistic methods, while the others–ethnographic text analysis, grounded theory, and discourse analysis–are usually considered to be research approaches to the development of text- and data- based concepts and theories. In most research studies it is a question of strategy: how to apply these methods.

We are providing a brief description of each method on the basis of its historical development and theoretical backgrounds, objectives, the range of freedom offered to investigators and the preciseness of the rules, quality criterion, and application possibilities. We should note that our descriptions present the widely recognised streams in each method, and "ignore" the wide range of diversities of interest to

adherents in the various fields. Appendix 1 contains a comparative table of the methods with an overview structured upon the discussion proposed by Titscher et al. (2000).

Content analysis

The development of content analysis has essentially been influenced by the development of mass media and by international politics. The theoretical basis for the first analysis of content was a model for mass communication by Lasswell (1946). His famous formula: 'who says what to whom and with what effects' determined the direction of research into modern mass communication.

Initially, the research was focused on causal relationships between communicator, receiver, and communicative effect. The content had to be quantified in order to investigate those interrelationships. In the mid-1950s, at least three theories shook up the approach: information theory, contingency theories, and interaction process analysis. This led to a reformulation of the method as 'communication analysis'. Preoccupation with printed texts was reduced. Since the 1960s, the explicitness of the selection procedures for the techniques has become a significant factor in the method. The 1980s brought new characteristics into content analysis such as the structure and selectivity of the communication process, multivariate techniques of analysis, development of indicators, and electronic analytical packages (Kolbe and Burnett, 1991). Nowadays, a combination of quantitative and qualitative techniques is widely accepted (Perry and Bodkin, 2000).

Overall, the objectives of content analysis can be summarised as: (1) to investigate the impact of content upon audience, (2) to systematise and quantify the content of communication, and (3) to identify specific characteristics of messages.

The essence of content analysis is that the categories must be set up and operationalised in advance. Changes in the operationalised schema can only be made in exceptional situations. The procedures, on the whole, distribute through quantification–analysing the frequency of coding–although there is a stream in content analysis that uses qualitative measures and considerations as to the importance of the context (Krippendorf, 1980; Kolbe and Burnett, 1991). Categories are understood as operational definitions of variables. The units of analysis are the smallest units of text in which the occurrence and the characterisation of variables are to be examined. These units may be defined syntactically (a word, a sentence), semantically (a statement, a unit of meaning). Precise operationalisation in advance, independence, and codification distinguish content analysis from other methods.

The simplest evaluation consists of counting the number of occurrences per category (frequency), and correlating between them: thus a relationship is assumed between frequency and meaning. More complex procedures include grammatical and semantic analysis. There are different typologies of content analysis procedures. Titscher et al. (2000, p. 63) propose basing analytical procedures in content analysis on semiotic levels and research questions. They outline 23 procedures for content analysis such as personality structure analysis, word class analysis, syntactic complexity analysis,

contingency analysis, frequency readability analysis, value analysis, and reality analysis.

Krippendorf (1980, p. 158) formulates the following specific quality criteria for content analysis:

- Validity (material-oriented–semantic validity, sample validity; result-oriented–correlative validity, prognostic validity; process-oriented–construct validity).
- Reliability (stability; replicability; precision).

Content analysis is likely to be used whenever communicative content is of great interest and an operational scheme can be formulated in advance.

In comparing with other methods, we note that, as with ethnographic and grounded theory methods, content analysis also works with categories that function as an analytical framework. Unlike those methods, however, the categorisation process in content analysis requires that the categories be set up in advance. Some of the techniques of content analysis may well be used within the framework of discourse analysis; for example, making use of a preliminary categorisation. The main difference, however, will be in the interpretation: content analysis is a fully object-oriented method, keeping to one side the influence of interpretations and the role of context.

Grounded theory

One of the roots of grounded theory is American pragmatism, and in particular the work of John Dewey, "including its emphases on action and the problematic situation, and the necessity for conceiving of method in the context of problem solving" (Strauss, 1987, p.5). Truth is therefore 'led' by practice: usefulness, value, and success are the criteria, i.e. what works in practice is true. As a further source, Strauss recommends the Chicago School of Sociology, which made a key input to field observations and in-depth interviews as methods of data collection. As a student in Chicago, Anselm Strauss–together with Barney Glaser, the founder of grounded theory–became acquainted with symbolic interactionism. Glaser, on the other hand, brought to grounded theory his dissatisfaction with standardised methods and multivariate analysis. Grounded theory does share with symbolic interactionism a number of basic assumptions about communication and interaction: actors react to social objects on the basis of the meanings they attribute to them. These meanings arise and develop through interactions (Titscher et al., 2000, p. 75).

Although grounded theory procedures are equally applicable to non-textual data, major importance is attributed to texts as data in the form of interview transcripts, observer's notes, books, newspaper articles, etc (Strauss, 1987). The most prominent application of grounded theory is probably text analysis. Within the framework of grounded theory, however, one will look in vain for a theory of text and for any explicit understanding of the term text (Titscher et al., 2000).

In the domain of IT research, Orlikowski (1993) describes the use of grounded theory as the basis of her interpretive case study into the adoption of CASE tools. In her

article, which received the 1993 MIS Quarterly Paper of the Year award, she uses grounded theory as part of an iterative process of data collection and analysis in order to "discover" theory from the field data. The paper elaborates on the methods of interviews and documents analysis as codifying them into categories and concepts. The technique uses a form of content analysis where the data are read and categorised into concepts that are suggested by the data rather than imposed from outside. Orlikowski (1993) first describes the incremental and radical organisational changes, then the findings are used to develop a theoretical framework for conceptualising the adoption of the CASE tools, and after that the resulting framework presents IT implementation as a process of organisational change over time, and not merely as the technical installation of a new system.

Recently, the grounded theory approach has become more widely accepted in the field of IT studies (Bowker et al., 1995; Pandit, 1996; Galal and McDonnel, 1997; Baskerville and Pries-Heje, 1999; De Vreede et al., 1999; Hughes, 2000; Urquhart, 2001; Pace, 2004).

As an example, an article by De Vreede et al. (1999) presents the first detailed cross-cultural analysis of GSS usage in Africa. A grounded theory approach was used to collect and analyse data on eleven projects in which GSS meetings were organised in Malawi, Zimbabwe, and Tanzania. From the data, a model emerged of GSS acceptance in the cultures investigated, and this extended the Technology Acceptance Model (TAM). That model included specific factors such as the endorsement of top management, computer literacy, oral communication preference, referent power, and satisfaction with use. Furthermore, the findings suggested that there was potential to apply GSS in Africa to support capacity-building efforts, something that tops the agenda of many international development agencies. A more recent example is the study by Pace (2004) on the flow experiences of Web users engaged in information-seeking activities. The term 'flow' refers to the state of consciousness that people experience when their attention is intensively focused on an enjoyable activity that is challenging, but also achievable. The data that was gathered for this study primarily consisted of semi-structured in-depth interviews with informants, of varying gender, age, educational attainments, occupations, and Web experience, who could recall experiencing flow while using the Web.

We will now consider the specifics of the grounded theory approach, particularly with respect to text analysis.

Grounded theory is not a specific method but a school of social science methodology whose research strategy can be summarised as follows.

The goal of grounded theory-oriented studies is to generate a theory. The focus is on exploration and the generation of hypotheses, while the testing of these receives less attention. Each individual case is an independent unit of study. It should first be reconstructed according to its own logic, with some theoretical goal. In other words, concepts should be formulated on the basis of a case. The process of theory building is like an artistic activity, in which the impartial and scientific views should be united. Everyday knowledge is considered as no different structurally from scientific knowledge. It is viewed as an essential resource for the scientific process and must therefore be made useful to it.

This theory is one "that is inductively derived from the study of the phenomenon it represents. That is, it is discovered, developed, and provisionally verified through systematic data collection and analysis of data pertaining to that phenomenon. Therefore, data collection, analysis, and theory stand in reciprocal relationship with each other. One does not begin with the theory and then prove it. Rather, one begins with an area of study and what is relevant to that area is allowed to emerge" (Strauss and Corbin, 1990, p.23).

The application of grounded theory does not require specific methods of data collection: but interviews and observations are the most often mentioned. Data collection is not considered to be a specific research phase, to be completed before the analysis begins. After an initial round of data collection, the first analysis begins to find indicators of concepts and categories and, on the basis of the results, further data is collected. In this way, data collection is never completely excluded (Strauss and Corbin, 1990).

Grounded theory is based on a concept-indicator model that helps to code empirical data in accordance with concepts (Strauss, 1987). Concepts are defined as labels that are attached to individual events (indicators). In this way, it is not a matter of prior operationalisation of theoretical constructs. A researcher investigates a situation and compares the findings with many other indicators, and then 'codifies' them as indicators of a class of events. Glaser (1992) proposes a framework for coding that he calls 'coding families'. Those coding families may include:

- c-families (causes, consequences, correlations, constraints),
- process families (stages, phases, durations, passages, sequences, careers),
- degree family (measure, degree, intensity, level, boundary value),
- type family (types, classes, genres, classifications),
- strategy family (strategy, tactics, techniques, mechanisms, management),
- interaction family (relations, interactions, symmetry, rituals),
- identity family (identity, self-image, change of identity, alien images),
- culture family (norms, values, socially shared attitudes),
- consensus family (construct, agreement, definition of situation, homogeneity),
- mainline family (social control, agreement, socialisation, organisation, institution).

For many concrete cases, only a few of these families will be appropriate or relevant. Based on these coding families, frameworks of theoretical concepts are developed with ongoing references to indicators. The coding procedure is undoubtedly central to grounded theory and distinguishes it from content analysis. Categories function as an analytical framework, but they postulate, unlike in content analysis where their inductive development is based on textual data (Glaser, 1992). On the basis of texts and contextual knowledge, concepts are developed, categorised, and dimensionalised. The significance of the categories is never measured by the frequency of coding within the categories. There are a number of key coding procedures in grounded theory, for example open coding (breaking down interpretations, examining texts), axial coding (creating new relationships between concepts), and selective coding (linking the core category to others).

Corbin and Strauss (1990) have developed specific evaluation criteria for grounded theory-oriented studies. These criteria are formulated as questions and aim to assess the adequacy of the research process and the empirical grounding of the findings (Corbin and Strauss, 1990, p.16). A well-documented grounded theory-based study should answer such questions as:

- how was the original sample selected (selective sampling)?
- which major categories emerged?
- which events indicated the emergence of the categories?
- how did theory guide the data collection?
- what were the hypotheses about relationships among categories; how and why were they formulated?
- how were the discrepancies accounted for in those examples of events where hypotheses were not confirmed?
- on what grounds were the final analytical decisions made?

To Strauss (1987), the whole world of the social sciences is suitable for the application of grounded theory studies: whenever new ideas, contexts, consequences, or recommendations have to be derived from texts. Titscher et al. (2000) note that a precondition for the application of grounded theory models is that the research objective has to be the generation of theory.

Though it has similar goals with ethnographic methods–i.e. generating theoretical concepts from text-based data–the goals highlight the major difference: ethnographical methods reconstruct the meaning of 'participants', while grounded theory constructs concepts and explanations of which the 'participants' are not (or need not be) aware. Another difference is that ethnographical methods do not have such an elaborated set of coding rules as does grounded theory (Strauss and Corbin, 1990; Glaser, 1992). However, while most studies based on grounded theory follow its inductive principles, the codes of grounded theory are usually used only as a small part of its repertoire because of their vagueness (Titscher et al., 2000). Unlike discourse analysis, grounded theory can be classified as fully object- or text- oriented. The basic rules of grounded theory necessitate a distance from the text.

Ethnographic methods

Within ethnography, there is a wide range of 'ethnographically-oriented' methods for text analysis (even including grounded theory in the opinion of some authors). The methods originate in anthropological and ethnographical works where the vital characteristic was fundamental reflexivity (Denzin, 1970). Ethnography analyses language and text in the context of culture, where culture 'denotes a historically transmitted pattern of meanings embodied in symbols' (Geertz, 1973, p.89).

Textual analysis is closely based on the context of culture: culture patterns influence and build social and psychological processes that in turn programme language and text. The relationship between culture and language is the starting point of the ethnography of speaking. It is accepted that language exists in a cultural context.

Probably the common feature of all ethnographic methods is the interpretation of texts against the background of cultural structures, or to use texts to reconstruct those cultural structures.

> "Doing ethnography is like trying to read a manuscript–foreign, faded, full of ellipses, incoherence, suspicious emendations… written not in conventionalised graphs but in transient examples of shaped behavior" (Geertz, 1973, p.10).

In outlining the ethnographic methods, we should note their specific features. First, the focus is on data collection, where participant observation plays the 'lead role'. Text analyses are found only in consideration of secondary sources such as documents. Secondly, as in grounded theory, data collection is not a separate phase but it is closely interrelated with the data analysis. Thirdly the investigation involves context, including facial expressions and body movements.

As Myers (1999) states, in recent years a growing number of IT researchers have recognised the value of the ethnographic methods for IT research. Some of the early work was by Suchman (1987) in her study into the problem of human-machine communications, and by Zuboff (1988) in her study on the automating and "informating" potential of IT. Since then, ethnography has become more popular and more widely used in the field of IT, including for example, studies on the development of information systems (Myers and Young, 1997), the management of information systems (Davies and Nielsen, 1992), and their impact in organisations (Randall et al., 1999).

One of the latest works on ethnography in the ICT field is the book by Crabtree (2003), where the author suggests new approaches to improve the development of collaborative information technologies: concurrent ethnography (work study and system development processes in parallel); evaluative ethnography (doing a short ethnographic study to provide a sanity check for a proposed design); and the re-examination of earlier studies. Crabtree (2003) proposes looking at work, not in order to generalise from it but to carefully observe the various communications during the process of system development. The results of observations are analysed with the help of the 'Designer's Note Pad' that enables the modelling of the physical layout of the workplace, the workflow, and the views of work (coordination, awareness of current work status, and plans).

The ethnographic methods show many similarities with grounded theory. An important instrument of ethnographic analysis consists of 'analytical categories' that must be developed for any application. The first step is one of developing concepts that help the researcher to "make sense of what is going on in scenes documented by the data" (Hammersley and Atkinson, 1995, pp.208–209). After the concepts are defined, the texts are coded. The codification process is a recurrent one: when new categories emerge, previously coded data must be recoded to see if they contain examples of the new codes. The first aim of the data analysis is to develop a stable set of categories, and then to code all the data using those categories. Next, the categories must be analysed in detail in order to investigate their precise meaning and their relationship with other categories (Hammersley and Atkinson, 1995). Another parallel with grounded theory can be made with respect to the 'constant comparative method'–

for each unit of analysis a researcher determines similarities to, and differences from, other units that have been coded in the same category (Hammersley, 1992).

The discussion on quality criteria for the assessment of ethnographic research has been the subject of controversy within the ethnographic tradition (Titscher et al., 2000, p.96). Essentially, there are two distinct streams: one that totally rejects the positivist quality criteria such as validity, reliability, objectivity; and one that accepts these quality criteria in a modified form. Hammersley (1992) proposes an adaptation to the concept of validity:

- validity means trust in results, rather than absolute certainty,
- reality is viewed as independent of the opinions of the investigator,
- reality is regularly illuminated from varying aspects (Hammersley, 1992, p. 50).

To increase the validity of results, two approaches are proposed. Firstly, triangulation–a term borrowed from navigation–here meaning the comparison of results based on different data and using different methods (Denzin, 1970). Secondly, respondent validation, meaning that the members of the research subject (the 'objects of investigation') are confronted with the results. However, whether, by suggesting improvements, they contribute to the validity remains contested.

The ethnographic methods seem to be appropriate where there is a need to explore not only textual patterns but also their relationship with cultural constraints that are of research interest.

In comparing the general ethnographic methods with other methods of text analysis, we observe that the former have many similarities with the methods based on grounded theory. These methods also work with categories, but they tend to have a conditional character. However, the coding procedure used in grounded theory is acknowledged as having greater detail (Titscher et al., 2000, p. 99). There is a clear difference with content analysis: precise operationalisation, sampling, independence, and quantifying are not principles seen in the ethnographic methods. In contrast with discourse analysis, ethnographic methods are fully text-oriented: the materials (texts) are at the centre of the investigation rather than their interpretations, althought the texts themselves are not the primary targets of ethnography.

Narrative semiotics

Narratives are usually understood as stories (with a beginning, a middle, and an end) that have conclusions or highlight some experiences of the storyteller (Fehse, 2002). The theoretical origins of narrative semiotics are to be found in the works on semiotics by Charles S. Peirce and Charles Morris, and in the structural linguistics of Ferdinand de Saussure.

The method assumes that communication consists of semiotic processes that are the links between signs and meanings. Semiotics views language as a complex system of signs, comprising both semantics (signification of symbols) and syntactic components (grammatical relationships of signs that are independent of their interpretations).

To semiotics, texts are systems of signs that always have two components: the surface structure at the level of syntax and words, and the underlying meaning. In the work of Fiol (1990) the narrative semiotics model appears as follows:

- The surface structure is believed to be immediately recognisable and readily accessible forms of text. These are the structures that are regularly investigated in traditional text and content analysis.
- The deep structure represents the fundamental system of values embedded in a text. This consists of norms, values, and attitudes that are universal in that they reflect, in the text, the value and norm structures of specific social systems.

As a link between these two levels, narrative semiotics construct a third level: the structures of manifestation, which are connected with the narrative structures. Manifestations are used to produce the meaning of the surface structures.

The main objective of this method is to reconstruct the narrative structure and the meaning structures of the text (Greimas, 1987). In addition, narrative semiotics seeks to identify a bridge between the surface and the deep structures (Fiol, 1990).

The analytical procedure involves several steps. The first phase of the analysis should give a general feeling for the three structures of the text: surface, deep, and manifestation. The text is usually divided into thematic blocks. The essential forces of the story are classified as actants. The second phase includes a more precise analysis of the individual thematic blocks. The actants are analysed separately for each segment. Then, the relationships between the actants, and the movements of actants, are determined. The list of possible movements includes acquisition, confrontation, suppression, cognition, extension, and modification. During the third phase, the investigator should progress from the narrative structure into the deep structure of the text. The surface structure is then put to one side so that a distance between the analyst and the text can be assured, and work can be processed on the basis of a formalised narrative programme.

The output of a narrative semiotic analysis should, at least, lead to insights into the deep structure of a text.

As quality criteria, narrative semiotics seeks to formulate and test hypotheses in order to be able to represent structures in models. Greimas (1987) also has ideas for validity and reliability, where he mainly refers to statistical procedures.

It will seem appropriate to apply narrative semiotics whenever stories are investigated: to determine their underlying structures and values. A precondition for the use of narrative semiotics is thus that the texts are able to demonstrate narrative components. The method is clearly not applicable to non-narrative texts. The scope of analysis is restricted in comparison to other methods because an investigation focuses on full textual segments (Greimas, 1987).

Given its concentration on narrative structures, a comparison with other methods of text analysis seems difficult. As with discourse analysis, it attempts to identify deep structures in texts. However, whereas discourse analysis views these as hidden meanings, narrative semiotics understands deep structures as the fundamental norms and values that underlie the story.

In comparison with the aforementioned methods, discourse analysis postulates inductive-deductive development, and can deal with both categories and structures (as can most methods). In principle, it does not have restrictions as to application spheres, but only demands availability and transparency of the information around the phenomenon, including social, historical, and other conditions. Discourse analysis may use techniques from content analysis such as codification, but it does not strictly quantify the findings, and it is strongly subject-oriented. This distinguishes it from content analysis and ethnographic studies. As in narrative semiotics, it attempts to identify deep structures of textual data but it does not need the full story. Beyond this, discourse analysis can work with multiple texts, investigating their interrelationships, a feature that is not developed in other methods. In this sense, discourse analysis is often considered to apply the broadest range of textual factors (Wodak, 2001). A further difference concerns the interplay between language use and society: discourse analysis does not consider this as deterministic but implies that the mediation is in the hands of an interpreter.

3.3.5 Discourse analysis theory: summary

Discourse analysis can be viewed as the methodological application of the main principles of the hermeneutic circle. It is important to note that it may combine features of both objective and constructive hermeneutics; thus, the explanatory 'objective' analysis of an individual text may provide the basis for open constructive interpretation of a set of texts, and then of the whole phenomenon.

To summarise, the method can be characterised by the following:

- Discourse itself is defined as a system of texts that brings objects into being. By texts we understand any representation (in written or spoken forms) of the "inner language" available for the researcher.
- Considering the constructive character of language, we view discourse as both constructive for the social world, and as being constructed by and within it.
- As observable by a researcher, discourse always lags behind the real intention of what one wants to or has to express. That is why Gadamer says, "to understand is always to understand *differently*".
- Through analysing discourse, the researcher intervenes between the past and the present meaning, and translates the social events into a form that is comprehensible to the 'owners' of the discourse.
- The goal of discourse analysis is to understand (interpret) the meaning covered by a text. This is to be achieved by exploring the interplay among text (linguistic features), discourse (set of texts), and context.
- The analysis of discourse is open to multiple interpretations, and also for new contexts which could cause the results to change. However, the ways in which researchers reach their results must be recognisable. Therefore, the scientific value is usually supported by the inter-subjective validity that is achieved by the interplay between open-ended interpretations and their transparency between individual and other texts, between single- and multiple- level interpretations within one set of discourses, between texts and contexts, and between the interpretive and the explanatory nature of their analysis.

Using the typology offered by Phillips and Hardy (2002), we can place our discourse analysis in the interpretive structuralism domain. This means that we will focus on the analysis of the social events [implementation of IT through group learning] and context in an organisational reality, and examine how discourse supports our research ideas. Taking the microanalysis of texts as our basis, we will transfer this to an interpretation of the whole context.

3.4 CARRYING OUT DISCOURSE ANALYSIS

In this section, we will combine the theoretical implications with our own development of the application of discourse analysis in IT research. We will show the eight steps that we developed and followed in our empirical research.

In general, the logic behind employing this method seems to be similar to that for traditional empirical research and can be seen as being based on a circular process covering the said eight steps: identifying a theory, operationalisation, sampling, conducting interviews, transcription, member check, analysis, and debriefing.

Although the whole research is intertwined with the interpretive ethics and principles described earlier in this chapter (Orlikowski and Baroudi, 1991; Klein and Myers, 1999), we believe that each step makes a particular contribution in some way. We pay particular attention to this during the presentation of each of the steps.

3.4.1 Step 1 – identifying a theory

It is important to realise that in this study we are investigating neither the linguistic features of discourse, nor the power division in IT implementation. Our primary concern is the social context of the use of technology and the discourse that supports it. We have labelled this approach as interpretive structuralist discourse analysis.

The principle of contextualisation is a vital one in our study. By exploring the interplays among text, discourse, and context, we attempt to make a link between the social event (implementation and use of technology) and a whole range of previously established events, history, interpretations, stories, backgrounds, and acounts of what all of these meant to various individuals. We insist that observable organisational patterns in IT implementation are constantly changing, not static, and that people (users of IT, policymakers, technical supporters and others) are active makers of the IT implementation process.

Role of the researcher

The difficult task for a researcher is to assess other people's interpretations, strain them through the own conceptual vision, and then to feed the findings back to the participants of the research and others. In performing this task, there are two possible roles for the researcher: the outsider as observer, and the involved observer refered to in action research (Walsham, 1995a). Both roles, however, imply the application of

the principle of interaction between the researcher and the subjects, and place the researcher in a historical perspective (Klein and Myers, 1999).

In this study, the choice was made to be an 'outside observer'. This requires keeping a distance from the events and the personnel in the case studies. We see one of the values of this approach as avoiding having a personal stake during the investigation, and especially during the interviews. This we believe provides an opportunity to create a frank atmosphere during conversations, one in which the interviewees can openly express their views.

However, from the interpretive perspective, this role should not be identified with the one of objective reporter because the collection and analysis of the data involves the subjectivity of the researcher and, as we described earlier, backs up the inter-subjective validity of the findings. In addition, with respect to the longitudinal case studies that we carried out over six–ten months each, we believe that we unavoidably influenced the processes of IT implementation and participants' interpretations: a process referred to as the "double hermeneutic" by Walsham (1995a). In this sense the strict distinction between the interpretive outsider and the action researcher becomes blurred. Simply by sharing our interpretations and concepts with the respondents we will have influenced what was happenning in the IT projects.

We acknowledge that our role was to intervene between the past and the present meanings of social events related to the process of IT implementation, by interpreting (translating) these into a form that was clear to the participants in the research.

3.4.2 Step 2 – operationalisation

The primary issue here is the extent to which the various methods are able to translate their theoretical claims into instruments (Wodak and Meyer, 2001), in other words to develop an operationalisation scheme and research instruments. A critical issue at this stage for researchers involved in discourse analysis concerns the use of theory: 'how can you use an operationalisation scheme that is a fixed framework in such an open method as discourse analysis?' The short answer to this is that the operationalisation is used to guide the interpretive research, and in so doing we follow the principle of dialogical reasoning advanced by Klein and Myers (1999). We will, however, expand on this answer.

Eisenhardt (1989) and Walsham (1995) discuss three ways of using theory in interpretive research: as an initial guide for data collection, as part of an iterative process of data collection and analysis, and as a final product of the research. The use of theory and operationalised categories in the early stages of an investigation provides an initial theoretical basis with which to approach the empirical work; i.e. it provides the lenses through which the data are constructed, documented, and analysed. These lenses, or prior knowledge, play an important role in the research. While, in the positivist tradition, such a "prejudgment" might be considered as a source of bias against true knowledge, discourse analysis acknowledges that prior knowledge is a necessary starting point for understanding (Klein and Myers, 1999).

In providing the initial categories, we acknowledge the necessity to distinguish the "true prejudices, by which we understand, from the false ones, by which we misunderstand" (Gadamer, 1976, p.124). This means that we have to take into account our own backgrounds as researchers. The practical implication for doing discourse analysis is to take care that we remain open to the empirical data, and are willing to modify our initial theoretical concepts. This will result in an iterative process of data collecting and analysis, and one of expanding, revising, or abandoning concepts.

Based on our theoretical investigations and a preliminary research model, we have determined the categories for coding: that is, we have operationalised constructs of technological characteristics, group support factors, managerial support, group learning, and stable use (Table 3.2). This operationalisation is the key to the conduct of our empirical study: we base the interview protocol on these categories, we transcribe interviews whilst checking whether we are in line with our theory, and we analyse the transcripts in accordance with the operationalisation scheme.

Table 3.2. Operationalisation of the research model

Constructs / definitions	Dimensions / definitions	Code/ Range	Components and Research instruments	
Technological prerequisites–the visible, technical properties of the system that users are offered.	1. The role of the system in a company–the intended goal and managerial reasons for introducing the system.	1.1	- grounds for introducing a new system	document analysis interviews with the project team
	2. Specification of the system–domain-based services that the system is supposed to deliver.	1.2	- modules and their functionality	
	3. Enabling collaboration–specific facilities for collaboration offered by the system for users engaged in common tasks.	1.3	- extent of possible cooperation offered by the system	
Group support factors–characteristics that maintain interactional processes in the group.	1. Structural characteristics–designs that facilitate competent group work (Hackman, 1987) through the significance and interdependence of job tasks supported by the system, and how a group is staffed (Campion et al., 1996).	1.1 1.2 1.3	- tasks significance and responsibilities - tasks interdependence - composition of the group	interviews with end-users document analysis
	2. Non-structural devices of the group–interpersonal understanding and psychological safety shared by the group (Edmondson, 1999; Druskat and Kays, 2000).	2.1 2.2	- knowing of colleagues' characteristics (i.e., backgrounds, interests, strengths) - mutual trust and respect for each other's opinions	
	3. Software experience–the level of workmanship in software use in the group.	3.1	- general software skills	

	4. Collective agreement on a groupware project–congruency of views on the development and implementation of the system among the involved parties.	4.1 4.2	- acceptance of the intention of the system - involvement in project development and implementation	
Managerial support–organisational arrangements and managerial behavioural patterns in technology implementation that are aimed at encouraging the use of the system.	1. Autonomy and responsibility–the extent to which end-users are given authority for decision-making and planning, and freedom in use of the system.	1.1 1.2 1.3 High –Low	- responsibility of the end-users in decision-making - freedom in use of IT - authority in planning work with the system	interviews with end-users interviews with managers observations in the field
	2. Promoting different learning opportunities–availability of formal and informal sessions, information, and different resources for learning the system.	2.1 2.2 2.3 Adequate – Poor	- formal training sessions - availability of material resources - consultations	
	3. Feedback–the level to which learning and use of the system is noted and rewarded by the managers.	3.1 3.2 Strong – Weak	- recognition of progress in use of the system - rewards	
	4. Management style–the extent to which managers' behavioural patterns are supportive, and their willingness to help in adopting the system.	4.1 4.2 Cooperativ. -Unhelpful	- willingness of managers to cooperate with end-users - consideration of users' ideas	
	5. Time–allowed time to take advantage of opportunities to learn the system effectively rather than 'muddling through'.	5.1 5.2 5.3 Sufficient Insufficient	- having time to practice with the system - having time to discuss the technology - managers' time allocated for end-users to discuss implementation issues	
Group learning–all the interactional processes in a group through which group members develop their interpretive schemes about a newly introduced technology, and	1. Collective acting–task-related operations with the system undertaken by members of a group.	1.1 1.2 Active – Passive	- operating with basic modules in everyday task performance - searching for new techniques in the system	interviews with end-users document analysis
	2. Group reflecting–communications upon the extent to which the system supports the performance of the tasks.	2.1 2.2 2.3 Strong – Weak	- discussing difficulties in use of the system - comparing with other software experiences - declaring individual problems in use of the system	

that help them to adopt it.	3.Knowledge disseminating–behaviours of group members that aim at the externalisation of ideas about the system in order to improve its usage.	3.1 3.2 3.3 Intensive–Fuzzy	- demonstrating how to operate the system - proposing new actions in order to improve the use of the system - clarifying difficulties to other members of the group	
	4. Sharing understanding–creating a common meaning of the system in terms of the role of the system and its functionality.	4.1 4.2 4.3 4.4 4.5 High–Low	- clarity about the purpose of the system - users' needs in the system - understanding of operating the system - attitudes towards the functionality of the system - attitudes towards the future state of the system	
	5. Mutual adjustment–activities that aim for collective agreements on the use of the system withina a group.	5.1 5.2 5.3 Strong – Weak	- arranging learning and other activities in order to improve the use of the system - developing regulations - evaluating intermediate results	
Efficiency of technology implementation–completion of the IT project according to the managemnt plan.	1. Meeting the planned budget and deadlines in the project.	1.1	- completion of the project on time and on budget	interviews with end-users observations
	2. Number of end-users adopting the new technology on time.	2.1 Efficient Challenged Failure	- number of users of the technology who adopted it on time.	
Stable use of the technology–task-consistent and skilful operating with the system.	1. Ease-of-use–a shared belief that use of the system is effortless for the group.	 1.1 1.2 1.3 High – Low	Perceived: - speed of operating with the technology - no difficulty in operating - friendliness of the interface	
	2. Task-system fit–a shared belief that using the system assists in the execution of group tasks (Lim and Benbasat, 2000).	 2.1 2.2 2.3 High – Low	Perceived: - importance of the system for the tasks - availability and quality of the data for the members of the group - match of the system with the ways of working in the group	

As follows from Table 3.2, we build our concepts on three levels: the constructs are divided into dimensions, and these then into components. Each construct and dimension is precisely defined. Some dimensions are 'single', i.e. having only one

component per dimension (technological characteristics, for example). Other dimensions, such as group learning, managerial support, and stable use are 'multiple', that is they have from 2 to 5 components per dimension.

Our operationalisation scheme also includes qualitative labels, such as 'strong-weak' and 'high-low', for analysing the dimensions of group learning, managerial support, and stable use.

3.4.3 Step 3 – sampling

Sample size is not usually a real issue in discourse analysis as the interest is in the variety of ways the language is used (Potter and Wetherell, 1987). Large variations in linguistic patterning can emerge from a small number of people. Therefore, a large sample size may just make the analytic task unmanageable rather than adding to the analysis outcomes.

Selection choices concerned the documents and the employees in the companies that were related to the technology implementation projects. We wanted to obtain empirical data on the knowledge, perceptions, and attitudes of managerial employees, members of project teams and end-users in the companies. It was intended that this would be achieved mainly through interviews, but we were also open to participation in discussions and meetings. The information about the context would be supplemented by observations and by analysing written materials–project documents, Internet sites, news reports, and technology manuals.

Overall, in the three cases studies that follow this chapter, we have conducted 83 interviews, each lasting from 45 minutes to 2 hours, and totalling around 110 hours. 90 employees were interviewed (there were some group-based interviews) as follows:

- 11 managerial employees responsible for strategic policymaking in the companies, and for selecting the information system.
- 10 members of the project teams involved in steering the technology implementation, who provided support for end-users, performed help-desk duties, maintained the functional and technical administration of the system, and sometimes analysed ongoing use of the system.
- 67 end-users of the systems, who had to work with the newly introduced technologies on a daily basis.
- 2 people responsible for the technical administration of the systems.

3.4.4 Step 4 – conducting interviews

Although evidence in case studies can come from a range of sources such as documents, archival records, interviews, observations, and physical artefacts (Yin, 1993); with respect to the role of an outside observer, it is argued that interviews deserve special attention (Walsham, 1995a). Reasons advanced for this are, firstly, that through interviews the researcher can best access the interpretations of the respondents concerning actions and events; and, secondly, that interviews, better than

any documents, enable researchers to step back and examine the interpretations of their participants.

As Potter (1996) has noted, "interviews have been used extensively in discourse analysis, but they are constructed in a novel manner" (p.134). Traditional interviews tend to aim to produce colourless interaction. However, in practice, interviews are as complex as any other social event, and responses to answers are dependent on the posing of the questions and the atmosphere during the conversation.

The main difference in conducting interviews for later discourse analysis is in their rationale. The goal becomes more complex–obtaining both consistency and diversity, whereas in the traditional interview approach consistency is the main evidential factor. In discourse analysis, the researcher's role is as an active participant in the conversation instead of being a "speaking questionnaire" (Potter and Wetherell, 1987). Therefore, the techniques to be used are different. Table 3.3 gives an overview of the main differences between traditional and discourse-oriented interviewing techniques.

Traditional interviews	Interviews for discourse analysis
Goal–to obtain consistency in responses, which is seen as one of the main indicators of reliable evidence.	Goal–to obtain both consistency and diversity in responses. Feedback and member checks are important evidence.
Techniques are oriented towards supporting consistency.	Techniques are oriented towards supporting diversity: - active intervention - provocative questions - informal information exchange - facilitating disagreements
All interviews are independent from each other.	Every interview is interrelated with the previous ones and the context.
The atmosphere during an interview should be neutral, business-oriented.	The atmosphere is business-oriented, but it is important to introduce informality.
An interviewer is a 'speaking questionnaire'.	The interviewer has an active role.

Table 3.3. Comparison of the main principles in traditional and discourse-based interviews

An example of using discourse techniques was a very interesting 'conversation' with a new member of a project team, which began by asking about her first impressions of the IT implementation, and which then brought insightful expressions and 'covered' all that was necessary for our purposes (in the third case study).

We were actively involved in the conversations, and stimulated variability by asking provocative questions, confronting respondents with opposing opinions, steering the dialogue, and by facilitating disagreements (Elliot, 1996; Hardy, 2001). We did have an interview protocol with semi-structured questions (see Appendix 2) but, during

conversations, we used a 'snowballing' technique: additional questions emerged during the talks or were based on our increasing knowledge of the context. Each interview was also related to the previous ones–we used information we had previously heard to enrich a new conversation.

3.4.5 Step 5 – transcription

There is some variety in transcribing discourse for work that attests to the phonetic and intonational features. Various transcription systems emphasise different features of interaction. In doing discourse analysis, a sociolinguist concerned with language variety, for example, will require an indication of accents; while a researcher interested in speech therapy will study the phonetics. Potter (1996) gives an indication that a ratio of one hour of taping to 20 hours of transcription time is not unreasonable (p.136). This should not, however, be seen as dead time before 'real' analysis begins. Often the enlightening analytical insights come during transcribing.

In our research, the sense and the lexicon on the meaning of IT implementation, as used by the employees, were at the heart of the transcription. For this reason, our records represented only words, and relatively coarse features such as corrections, doubts, confusions, clarity, vagueness, self-evidence, and hesitations. With this approach, transcribing each of the 82 interviews still took about three hours. Our transcriptions, therefore, resembled 'normal texts', for example:

> "I would like to search in the Internet. I really would need to look at the websites of other insurance companies, especially from USA, to see their latest developments. I want to learn more about different product concepts. In my view, in its current situation, the Internet has even more opportunities for me to learn than our current system… unfortunately" [Mike, product manager, InsurOrg case study].

Insightful additions to the transcriptions were drawings made by the interviewees during the conversations. For example, one employee tried to explain to us his understanding of the IT project. With the words, "I will make a simple picture to clarify our project", he then drew the following masterpiece (Figure 3.2).

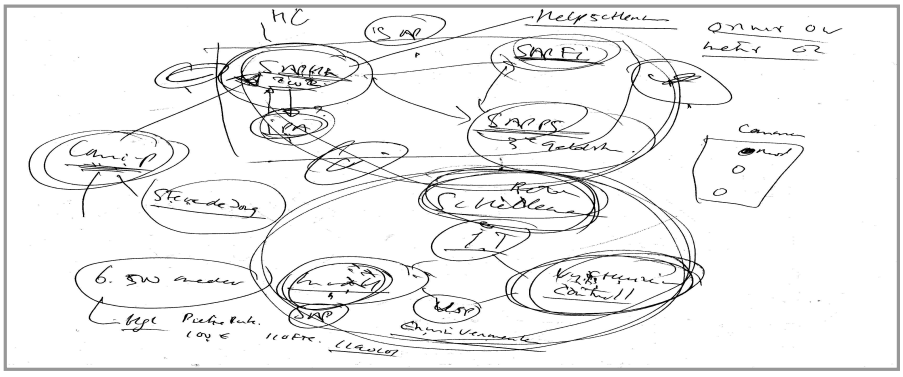


Figure 3.2. Visualisation of an IT project drawn by an interviewee (third case study)

3.4.6 Step 6 – member check

This step is essential in discourse analysis, as one of its main principles is to achieve common understanding. A member check gets feedback from the interviewees on the correctness of the transcripts. We have discussed the transcripts of all the interviews with the respondents. Most of the time this took place through e-mail correspondence, with interviewees writing their opinions in the body of the message, and correcting the transcripts 'on-line'. Sometimes there was a need for an additional discussion. Thus, during our first case study, a one and a half hour interview was followed-up with three one-hour talks with the respondent. In fact, this stage resembled a second round of mini-interviews. It ensured correct and precise expressions for use in the later analysis.

3.4.7 Step 7 – analysis

After the interviews were transcribed and corrected by the respondents, it was time to analyse the sets of texts. This step includes various levels of analysis that together aim to understand the IT implementation in its social and historical contexts. It is achieved by iterating between the interdependent meaning of parts, and the whole that they form; and by iterating between the prior theoretical concepts and the empirical findings.

The hermeneutic movement of understanding first develops here from the parts (explication of the ideas from the interviews transcripts) to the whole (explication of the context about organisational background, participants in the research and their interactions). Then, again to the parts (categorisation of the text units in the transcripts according to the research model), and then back to the whole (raising the text units to the level of the research constructs). Once again we then return to the parts (characterisation of the linguistic features of the text units and refining every component in the research model), and finally back to the whole (finalising general relationships and functions in the initial theoretical concept). Table 3.4 below provides detailed information about the steps in the analysis of texts that we followed in this research.

Level	Clarifying questions	Sub-steps
Level 1 Explication of the main intention per interview transcript	How can a text be "normally" understood? How can a statement be rewritten, paraphrased, transformed? What does an interviewee wish to present, emphasise, stress? What intention is being traced? What would be an acceptable interpretation for this person?	1. Reading interview transcripts 2. Gaining a general impression 3. Making initial notes
Level 2 Explication of the context about the	What are contextual factors that might be linked to a story in the interview transcript? Are there	4. Wherever applicable make second set of notes concerning the context

organisational background, participants in the research, and their interactions	background, historical, or other factors, known by the researcher, that might come through through the statements?	
Level 3 Categorisation of the transcript in accordance to the research model and operationalised components of the dimensions	What are the text units in the transcript related to the research constructs, dimensions, and components? Are there text units that can be placed in more than one component or dimension?	5. Reading interview transcripts 6. Codifying every text unit on the basis of the research model 7. Compiling sets of interpretive accounts per component, dimension, construct (for example, in tables)
Level 4 Explication of the main meaning of the research constructs	How can the dimension or construct be understood as a whole? How could the text accounts be understood in accordance with the research intention, model?	8. Reading interpretive accounts per set 9. Labelling every unit in line with the research intention (in a qualitative way, for example, "strong-weak") Depicting the research construct 10. Extracting the core summary
Level 5 Characterisation of the linguistic features of the text units	What can be said about the linguistic presentation in the units? Convincing arguments, clarity, vagueness, transparency, self-evidence?	11. Reading interpretive accounts per set 12. Identification of the linguistic presentation of every unit
Level 6 Refining components– extrapolation of the interpretations to every component	What can be said about the relevancy of every component for the dimensions in the research model? Are there dimensions that can be restructured after such a revision?	13. Identification of the noteworthiness of every text unit for the particular component 14. Identification of the significance of every component for the dimension 15. Refining structures of the dimensions (unifying some components, eliminating others)
Level 7 Explication of general relationships and functions in the research model	What can be concluded about the significance of every dimension and about their place in the theory?	16. Refining the research model

Table 3.4. Interpretive levels, research questions, and concrete steps in the analysis of the interview transcripts and documents in this study

We took the basic idea from Titscher et al. (2000), and developed the analytical steps based on the interpretive hermeneutic levels distinguished by Oevermann (1996). There are seven levels of interpretation–from a general understanding of a transcript towards understanding the constructs' contents and their relationships in the research model. In other words, this framework is our way of refining the model which was developed from the literature, on the basis of the interview analysis.

Clarifying the questions in Table 3.4 is intended to support the researcher in transforming an interpretive level into concrete research actions, referred to as sub-steps. We will now elaborate on these sub-steps.

A first glance at the 16 sub-steps reveals cyclic readings of the transcripts–in this study we have read all the transcripts at least four times, and the analysis can be divided into four parts.

First, we needed to gain an overall impression and link this with the context that was acquired from the documents and observations (sub-steps 1–3). Knowledge of the context was crucial in order to understand and *feel* the implementation. For example, a simple phrase provided by an interviewee, "the system was built in accordance with the budget" (second case study), obtains a specific meaning if we know that there was *no* budget at all for the technology.

The second part was aimed at describing every construct in the model on the basis of the text units. We began by compiling sets of text units for each construct (group learning, managerial support, and stable use).

An extract from a set of text units for the 'managerial support' construct is given in Table 3.5 as an example (from the second case study).

Dimension		CODE AND CORE EXPRESSIONS	Range
1. Autonomy and responsibility	1.1	"At the beginning everybody could and did participate in its development and design. We thought that the usage of KennisNet would grow dynamically progressively…" (P-1)	High
	1.1	"At the beginning we sent the information to the managers, and they made inputs in KN. I participated in that and found it more attractive than the current situation, when you have to input everything yourself. Maybe the idea behind that was to control the inputs, but I am not sure. At least at that time we made some inputs." (P-5)	Low
2. Learning opportunities	2.1	"I don't remember any special educational activities around the introduction of KN." (P-2)	Poor
	2.2	"Maybe a manual exists but I don't know." (P-2)	Poor
	2.3	"I remember even that one of the managers used to come regularly to me to ask how successfully I was operating with KN." (P-5)	Adeq.

Table 3.5. An example of a set of selected text units for the managerial support construct

To achieve this, we had to distinguish and codify the text units from all the transcripts on the basis of our operationalisation scheme. Units were placed in more than one set if they contained the meaning of different components. Working the sets out involved making additional insightful notes in the margins and giving labels to every text unit within a set. We did this in a qualitative way as proposed in the operationalisation scheme ('strong–weak', 'high–low').

Following this, it was possible to depict a construct as a whole (sub-steps 4–9). In the case reports, in the following chapters, we will present the full description of the constructs based on the analysis of the sets of text units, while the sets themselves can be found in the appendices.

In total, we have analysed 835 text units: 436 for the group learning construct, 222 for the managerial support construct, and 177 for the stable use construct.

The third part of the process was focussed on identifying the noteworthiness of the components for the dimensions and constructs in the research model (sub-steps 10–15), which involved combining three angles:

- the factual representation of the text units per component;
- the linguistic features of every text unit; and where applicable,
- the historical background that contributed to the evaluation of the whole construct.

We used the framework of Matouschek et al. (1995, p.60) to analyse the forms of linguistic realisation. This involves revealing the statements' vagueness or clarity through looking for generalising references, metaphorical expressions, use of jargon, stressing hidden meaning, text coherence, rhetorical questions, and doubts as against black and white painting.

The fourth part involved refining the research model developed in Chapter 2 (sub-step 16, Table 3.4).

3.4.8 Step 8 – debriefing

This is the final step in the analysis. The principle of multiple interpretations is crucial at this stage. Multiple viewpoints, different interpretations, confronting with opposing views–all form the basis for the final revision of our understanding. Such revisions are similar to the application of the hermeneutic principle of dialogical reasoning, except that it is not a confrontation of the researcher's prior theory with the empirical data, but a confrontation of conflicting interpretations offered by the participants.

We were open to a range of interpretations of the empirical data. Striving to reach a common understanding, we have discussed our intermediate reports within the companies where the research had been conducted. Ongoing scientific discussions about the findings and results moved us forwards towards the final reports and conclusions.

So far, we have presented the eight steps we are going to follow in 'doing' discourse analysis. At this stage, it is appropriate to outline the practical backgrounds used in our investigation–the case studies.

3.5 CASE STUDY DESIGN AND REPORTING

We will not elaborate on case study methodology too deeply as there are many overviews available (for example, Eisenhardt, 1989; Yin, 1993; Stake, 1994; Miles and Huberman, 1994). In this section, we elaborate only on the specific points of the application of a case study approach as used in our study.

Firstly, we should state the objectives of the case studies. Case studies became the contextual background in which to undertake the discourse analysis. The goal of the case studies in this research was to clarify and enrich the preliminary model developed after the literature search. This included:

- exemplifying the theoretical discussion on the implementation of IT through group learning,
- clarifying the contents of the constructs of group learning, managerial support, and stable use of technology, and
- refining the research model.

Secondly, we should justify the case studies selected. As far as the discourse analysis was concerned, we did not have strict criteria for companies to participate in this project, but it was important that a company had a recently introduced information technology. In the period from March 2000 until December 2002 we conducted nine pilot cases in different organisations: two insurance companies, two software design companies, two governmental organisations, a bank, a hospital, and a small manufacturing company. The purposes of the pilot-cases were firstly to explore their relevancy to our research, and secondly to achieve some understanding of the way the research should be conducted, the transparency of the resources including the unconstrained availability of end-users, and research 'freedom'. It was of course important to achieve a common language with the companies before employing research instruments. Three companies were selected from this shortlist for the main case studies: a hospital, an insurance company, and a governmental organisation. These are referred to as: Medinet (the first case study), InsurOrg (the second case study), and AcademCentre (the third case study).

Thirdly, in terms of the unit of analysis, the investigation focused on the end-users within IT projects.

Fourthly, the case study techniques, i.e. the research instruments, employed in the case studies strived to build a platform for discourse analysis: document analysis, interviews, and participatory observations of IT project activities.

Fifth, the case duration: we needed longitudinal cases in order to be able to dive into the reality of the IT projects and be able to interpret them. The first case study took ten months, and the other two, six months each.

Sixth, each case resulted in its own report. Each case study report starts with an extended introduction in which we presented the essence of the study; describing the background of the IT project, its history, and origins. We considered that it was necessary to describe the research methods employed in each case because the empirical data collected from the companies varied slightly: number of the respondents, sort of documents analysed, and formal and informal activities in which

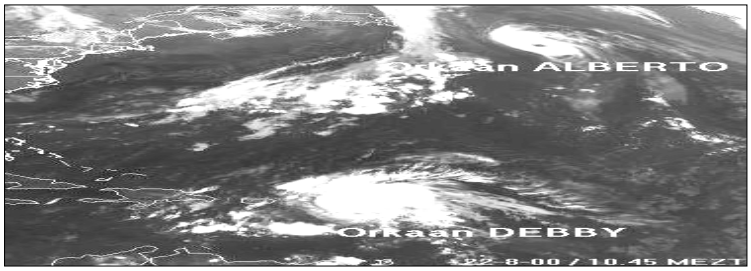
we participated. Further, the structure of the case study reports mirror the discussion in the theoretical chapter so as to present the blocks from the preliminary research model:

1. characteristics of the groups of targeted employees (structural characteristics such as task design and task interdependency, non-structural devices such as psychological safety and interpersonal understanding, and software experience of the users),
2. features of the technology (its roles in the organisation, specification of the functionality, and extent to which the system supports collaboration),
3. adoption of the technology by the employees through group learning (collective acting, group reflecting, knowledge disseminating, and sharing understanding),
4. managerial support provided to the users (authority and responsibility, promoting different learning opportunities, feedback to the users, management style, and time to practice with the system), and
5. success of implementation (stable use of the system and efficiency of the IT projects).

Following these descriptions, we reflected on the research model by considering the relevance and the contents of the constructs of group learning, managerial support, and stable use (at the level of components). This allowed us, firstly, to reconsider the contents of the dimensions and constructs and, secondly, to rethink their placement in the research model. Therefore, we could refine the research model after each case study.

At this point, we have explained at some length the theoretical background and the methodology to be used in this research. The following three chapters put this into practice and discuss the three case studies that were undertaken.

4. A "DOUBLE" CASE STUDY – IMPLEMENTATION OF THE BEAUFORT SYSTEM



"Beaufort would bring fresh wind to the work life in Medinet."

Information Bulletin No. 34, August 2000

Our first case study is on the implementation process for a personnel administration system–Beaufort–in a Dutch hospital "Medinet"[1]. The project, involving initiating the acquisition of a new information system, development of the project plan, decision making, and realisation–started in June 1999 and was expected to be completed in December 2001. The intended users of Beaufort were two groups of personnel specialists in the organisation: users from the personnel and salary department PSA, and decentralised users that included personnel managers and personnel secretaries in all the various departments in Medinet. The project seemed to be planned carefully, the system's introduction was proposed in an evolutionary manner, including pilots in various organisational units, regular evaluations, and user participation. However, after a seemingly successful implementation in the early stages, the project was frozen in a late stage, and now has an unclear future.

4.1 INTRODUCTION

The project had two planned phases: the introduction of the system to the central personnel and salary department PSA, and then a subsequent organisation-wide introduction to all the decentralised users. These were treated as two distinguishable sub-cases. The PSA department implemented Beaufort efficiently, in accordance to the initial plan (sub-case 1). The introduction of two modules of the same system to the decentralised users failed (sub-case 2). That led to the halting of the whole project.

[1] In this case report, and the other two, we have purposefully changed all the names that could lead to identification.

This, our first case study was intended to refine our initial understanding of the role of the group learning processes in IT implementation. We wanted to deepen our theoretical investigation by looking at IT implementation and group interactional processes in practice. Therefore, the goals of this case study were threefold:

- to exemplify the theoretical discussion about implementing IT through group learning,
- to clarify the contents of the constructs of group learning based on the experience of the Beaufort users, the managerial support, and the stable use of Beaufort, and
- to refine the research model on the basis of the Beaufort implementation.

We formulated specific research questions for this case study:

- How did the evolution of the whole Beaufort project develop from the introduction of the system through to its stable use?
- Which group learning processes promoted the adoption of Beaufort by the PSA specialists (a 'positive' sub-case)?
- Which group learning process hindered the adoption of Beaufort by the decentralised users (a 'negative' sub-case)?
- What were the differences (if any) between the managerial support issues in both sub-cases?

In this chapter, we first explain the methods employed in the case study. Following this, we will present the organisational context of Medinet, the background to the Beaufort project, and an historical account of the Beaufort implementation (Section 4.2). After this, and following our research model approach, we shall describe the characteristics of the two groups of the Beaufort users: PSA employees and decentralised users. We will pay special attention to those differences between the two groups that, in our view, contributed to the differences in the interaction processes within the groups (Section 4.3). Then we will present the technological features of Beaufort–its modules and the ways in which employees were supposed to use it (Section 4.4). Next, we will discuss the implementation of Beaufort in terms of group learning (Section 4.5). The managerial support for the implementation is then outlined (Section 4.6). Then, the results of the project in the two settings will be discussed (Section 4.7). In so doing, we will support all of our findings with quotes from the interviews with the users of Beaufort. In drawing conclusions from this case study, we will analyse and refine the research model. To achieve this, we will discuss the content of the constructs-dimensions-components in the model using discourse analysis. We will finalise the report on this case study by 'mapping' the research model and drawing specific conclusions for the Beaufort project (Section 4.8).

4.1.1 Methods

In order to investigate the Beaufort implementation process, we carried out a longitudinal case study in Medinet. It began four months after the introduction of Beaufort to the first users, and lasted for ten months. The detailed data collection was mainly conducted through qualitative methods: semi-structured interviews, observations in the field, and document analysis.

34 interviews were conducted each lasting from 45 minutes to 2 hours, totalling 48 hours in all. Most of the interviews were with individuals, although three group interviews were also conducted given the office environment. Some of the interviews were spread over two meetings, as there was a need for additional clarification and information.

We have interviewed 42 people out of the 50 involved in the project's realisation (84%). Table 4.1 shows the types of interviewees and number of interviews conducted at Medinet.

Representatives of three groupings in Medinet were interviewed:

- The policymakers in Medinet who closely participated in the Beaufort project: the manager of ConcernStaff, the board member from the Department of Social Affairs, and the manager of the PSA Department;
- Members of the Beaufort project team: the project manager, and members of the team;
- End-users of Beaufort: employees of the PSA department who worked with the system, and employees who participated in the decentralised pilot on the use of Beaufort.

The interview protocol remained essentially the same for all interviewees (see Appendix 2), but we made some changes in emphasis.

Job position		Number of interviews	Total
Policymakers		3	3
Members of the Beaufort project team		4	4
End-users	Employees of the PSA department	16	16
	Decentralised users:		19
	HR local managers	4	
	HR managerial specialists	9	
	Personnel secretaries	6	
Total			42

Table 4.1. Type and number of interviews conducted at Medinet

In talking with the policymakers, we aimed to acquire knowledge about the strategic plans of Medinet, the role of Beaufort, and the culture of the company. The members of the project team told us about the specific characteristics of the project organisation and its implementation. The PSA employees and decentralised users were mostly asked about their institutional use of Beaufort and group processes.

The transcriptions of all 34 interviews were discussed and checked with the interviewees.

A lot of information about the on-going development of the project was obtained through informal daily conversations with the project team members. This kept us up-

to-date with various details of the Beaufort implementation. This built trust between the 'researcher' side and the 'subject' side. It helped to develop a common language, to understand the culture of Medinet, and the sub-cultures of the various departments.

We studied documents such as the strategic plan, the Beaufort project plan, the user manual, and documents and protocols of the project steering group. In addition, we took part in three departmental (PSA) meetings devoted to ongoing problems with the use of the system, two meetings of the project's steering group, and four instructional sessions for new users. In total, these direct observations lasted 22 hours and resulted in field notes and transcripts.

Qualitative data was analysed through discourse analysis in accordance with the theoretical framework. It is presented as a detailed description of all the dimensions in the implementation process.

4.2 THE ORGANISATIONAL CONTEXT

Medinet was founded in 1990 by the merger of three smaller local hospitals and two polyclinics. The fusion aimed to combine the efforts of various regional healthcare organisations, and improve and centralise the healthcare service in the region.

Medinet today is one of the largest general hospitals in the Netherlands, with 1,070 beds and around 3,800 employees. Nowadays, the primary processes in Medinet (examination, treatment, and nursing of patients) take place in five clusters: A1, A2, H1, H2, and O (see Figure 4.1). Four of the clusters (A1, A2, H1, and H2) are situated close to each other in a large city. The fifth cluster (O) is situated in a neighbouring town, some 12 km away. There are also two smaller medical units located 11 km and 15 km from the city. Each cluster is further subdivided, and in total Medinet has 64 departments.

One of the central management units in the hospital, the Strategic Centre, is responsible for the social, information, personnel, and financial functions. However, each department has its own personnel manager who implements the central strategy. Medinet has support departments, Facilities Affairs and the Medical Technical Centre, that help in running the primary processes. The Strategic Centre and these supportive departments have representatives in all the clusters who actively communicate across Medinet and contribute to building a united Medinet culture. Every location still, however, keeps, to an extent, its own 'pre-fusion' norms and traditions, especially concerning management processes and task divisions.

4.2.1 Background to the Beaufort project

The fusion processes have resulted in the restructuring of the hospital, including its personnel services, over the last decade.

Initially, personnel management was highly centralised: employees had to contact officers from Social Affairs or from Facilities Affairs with their private or work questions. It would sometimes take weeks for an employee in the outlying cluster to

get a document from the salary department located in the main town. Each month the central salary department received about 14,000 administrative requests from employees about such things as changes in addresses, switching to another contract, processing vacation days, changing insurance policies, modifications to the pension scheme, and adjustments to flexible appointments.

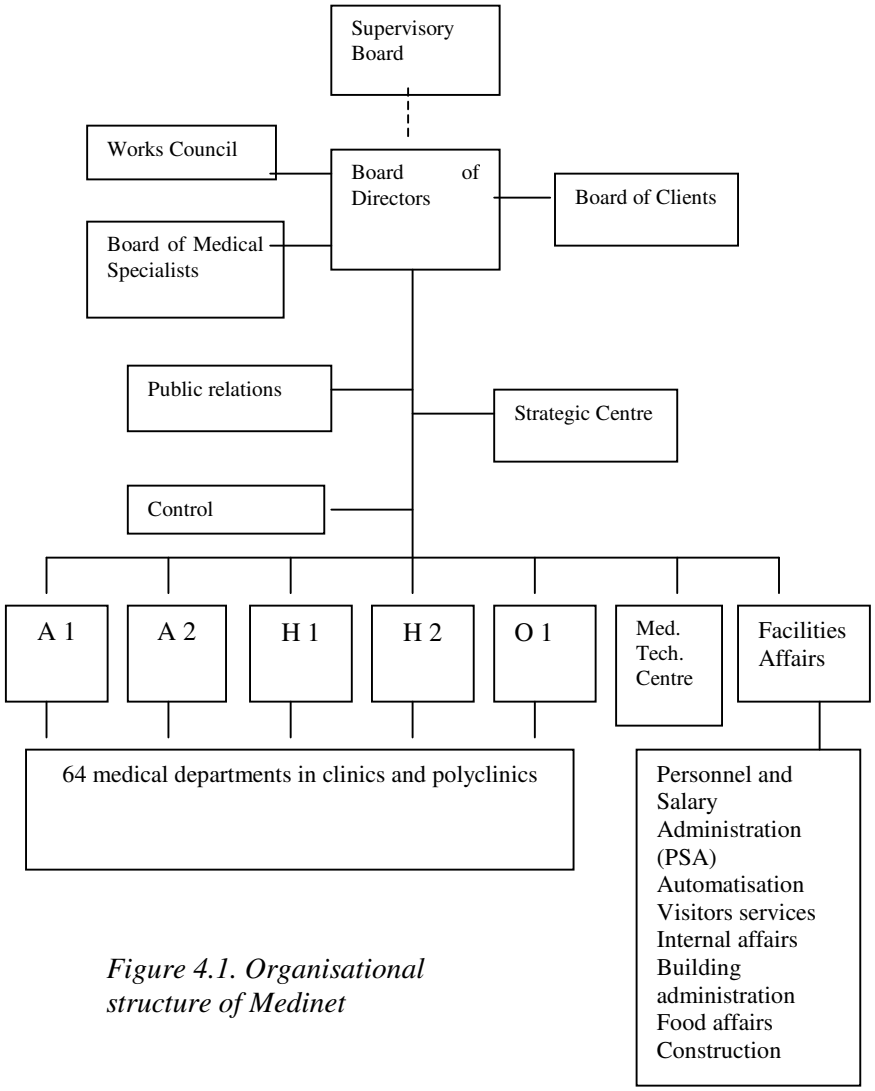


Figure 4.1. Organisational structure of Medinet

In 1998, Medinet management started a long-term HRM project aimed at the decentralisation of personnel management. The main idea was to have one 'frontline' personnel manager at each location responsible for direct communication with the employees.

To achieve the more efficient administration of HRM information, and to restructure personnel management from a highly centralised approach to a decentralised form, the Strategic Centre decided to look for an IT solution that offered a personnel information system that could support and incorporate the new HRM policy.

The existing digital personnel information system seemed to be outdated and could not meet all of the new requirements and store all the necessary information (Fehse, 2002). In addition, the contract for the old system was about to expire. Given this state of affairs, in 1999, Social Affairs started a project to implement a new IT system across all levels and all departments of Medinet. The project was granted an initial budget of €1 million.

4.2.2 History of the Beaufort introduction in Medinet

The Social Affairs department decided that the full implementation should be completed within 15 months: from September 2000 to December 2001. The project team developed an implementation plan consisting of three major steps: firstly, the introduction of the system to the PSA employees in September 2000; secondly, pilots with two Beaufort modules in four decentralised departments between March 2001 and June 2001; thirdly, the introduction of two modules to all the decentralised users in the 64 departments between September and December 2001. It was expected that from December 2001 onwards all the relevant staff would be working with Beaufort.

A chronological account of the project history is given in Table 4.2. It is immediately apparent that there are differences between the introduction of Beaufort to the PSA department and to the decentralised users. It shows that the implementation plan was strictly followed up to the time when two Beaufort modules were distributed to the decentralised users in four pilot departments: the laboratory, intensive care, kitchens, and the nursing department. Firstly, some technical problems related to the IT infrastructure in Medinet caused delays. Next, the project team discovered that the PSA tasks were not operationalised, and therefore could not be transferred to the decentralised users (resolving this situation took additional time). Lengthy negotiations with the suppliers (Getronics), discussions with the PSA department, complications with the Beaufort pilot trials, financial difficulties, and the project leader leaving the project, all created a negative atmosphere surrounding the project, which was eventually halted in December 2001.

4.3 CHARACTERISTICS OF THE TARGETED EMPLOYEES

In line with our research model, we should look at the structural and non-structural group characteristics of the Beaufort users.

In this section, we will show that we discovered a major difference in the characteristics of the two groups. The PSA employees had been used to working together as a group for years, whereas the decentralised users did not even know each other very well before the introduction of Beaufort. The tasks to be performed through the system were primary for the PSA employees, but only secondary for the decentralised users. The system did not lead to many changes in the PSA department, but brought many ‘surprises’ to the decentralised users: a growth in the importance of administrative tasks, a new way of performing them, and greater responsibilities. Let us have a closer look.

Period		Actual activities	Intended activities[2]
	February 1998	First meeting in the Social Affairs department about the need to have a 'decentralised' system for HRM.	
	December 1999	A system was chosen based on the functional requirements.	
Sub-case 1: Implementation of Beaufort (all modules) to the PSA department	July 2000	Randomly selected PSA employees and decentralised users attended a 2-3 day course on how to use some of the modules of the system. They were expected to later teach their colleagues.	
	September 2000	Technical introduction of the system to the PSA employees, trial use of the system, peer teaching and instruction.	
	October–December 2000	Starting to use the system by the PSA employees–the most difficult period of getting used to the system. Weekly discussions about ongoing use, consultations with the supplier's representatives, continuing instructions. Based on evolving requirements, the second version of the system was introduced.	
	January–February 2001	Stable use of the system by PSA without major problems, preparation for the decentralised introduction of the system to the whole hospital.	
	March 2001	Stable use of the system by PSA. Technical problems faced in the ICT infrastructure of Medinet. Functional bias discovered in the PSA tasks: sick leave is entered into the system only once a month. This would complicate work for the decentralised users. Many efforts are needed to regulate those procedures.	Introduction of the sick leave administration module to four departments.
	April 2001	Solving technical problems in the infrastructure. Negotiations between the project team and PSA employees about the vision of using the sick leave administration (SLA) module in a decentralised manner, attempts to make daily inputs by the decentralised users possible.	Trial use of SLA module in a decentralised manner.
	May 2001	Necessity to change the server in the hospital dictated by the supplier. Discovery of the next problem: once a month PSA workers have to submit the sick leave data to the central Health Insurance Office in the Netherlands. During that day, the system blocked decentralised inputs.	Introduction of time registration module to four departments.

Table 4.2. The history of the Beaufort project in Medinet

[2] Where different from actual activities

Sub-case 2: Implementation of Beaufort (two modules) to the decentralised users	June 2001	Introduction of the SLA module to one decentralised user-department (instead of four as planned). The department was not used to working with software. After two weeks this pilot was frozen; the local manager had made one 'content' mistake in entering data which led to a large financial loss.	Trial use of the time registration module in a decentralised manner.
	July 2001	Discussions with PSA workers and agreement on task identities and procedures. Making an official document for the decentralised users with the rules on the 'when, what, and how' for sick leave administration. Introduction of the SLA module to another decentralised user-department, one that was very experienced in working with software.	Evaluation of pilots.
	August 2001	Discussions with the supplier on possible improvements to the SLA module. The second decentralised user-department faced large problems because of a lack of knowledge on health administration.	Preparation for the whole company.
	September 2001	Evaluation of the decentralised use of the SLA module. The decision was taken to stop all attempts to continue with the decentralised use of the module because of the complexity of the health administration content.	Connecting 65 departments to the system.
	October 2001	Introduction of the time registration module to four decentralised user-departments.	Evaluating and improving ongoing use of two modules in all departments.
	November 2001	Discovery of differences in the internal departmental rules for the registration of working hours which could not be identically input into the system.	
	December 2001	Decision made to freeze the decentralised use of the two Beaufort modules in order to evaluate and improve the technical and functional characteristics of the system, and to reach a collective agreement among all the potential decentralised users and the PSA on how to work with the system.	Stable use of Beaufort in Medinet.

Table 4.2. (continuation) The history of the Beaufort project in Medinet

4.3.1 The structure of the groups of Beaufort users

The PSA department consisted of 17 employees of whom 70% were female. Their average age was 33.4; the average time spent working in the department was 4.5 years; and 70% of the employees were educated to high school level. The group was divided into three sub-teams, each with five or six members. In every sub-team, there were one or two salary administrators responsible for the correctness of the final inputs, and staff members responsible for inputting the data. All 17 employees were based in one location in Medinet.

The decentralised users who participated in the research included 19 end-users of the system of whom 80% were female. The average age was 36.2; the average time working for their departments was 8.5 years; and 65% of them were educated to high school level. Decentralised users were not a group and did not become one during the project. The idea was that such a group would eventually include at least 64 members, located in different places in the hospital.

4.3.2 Non-structural devices of the groups of Beaufort users

When we looked at the non-structural mechanisms of the two groups, we again discovered differences. As a department, the PSA staff had a long history of working together. They had been working as a team since 1999, and most of them had known each other for 5-12 years. Every morning they had thirty-minute coffee breaks, where they talked about various problems, and sometimes expressed rather critical ideas about Medinet management, and also about the Beaufort system.

Our case study involved only those decentralised users who had participated in the pilot Beaufort implementation project and thus they were drawn from four departments (Medinet laboratory, intensive care, kitchens, and the nursing department). As mentioned earlier, the project did not proceed beyond this pilot stage.

These departments differed from each other in terms of internal culture and rules. In some, the managers administered the personnel information themselves, in others, secretaries did the work. For example, in Department [A] involved in the Beaufort project, there were more than 100 full-time employees and about 60 students working evenings. Department [A] was not involved in the primary processes in the hospital and was known to have a relatively relaxed internal atmosphere. The administering of the personnel information was usually done by the manager's assistants and, sometimes, by the manager himself. Department [B] had 140 full-time workers and about 80 part-time employees, and consisted of five sub-departments. This department was involved in the primary processes in the hospital, and was known for its strict internal traditions and rules. The personnel information was administered by the secretaries. The decentralised users thus never worked together as a group in order to perform HR administrative tasks, nor were they interdependent regarding these tasks. They did not know each other very well, and they preferred to keep to their own

opinions and strategies. They were used to working independently (in fact encouraged to do so) in creating their departmental HRM policies.

4.3.3 Tasks and responsibilities

The two groups of users managed personnel information with different emphases: for the PSA employees such tasks were primary, but for the decentralised users these were only secondary tasks.

There was close cooperation between the PSA staff and the decentralised users: every day the latter sent information about any changes in personnel data to the PSA using special paper-based forms. Day-to-day communication between the representatives of personnel management in all the departments and units utilised internal paper-based post, e-mail, fax, and the telephone. The concept, following the introduction of the new personnel system, was that decentralised users and secretaries would input personnel data straight into the system, and that the PSA employees could immediately use these data to make any salary modifications.

Tasks and responsibilities of the PSA employees

The PSA members, being part of the Facilities Affairs department, were responsible for processing the salaries of all the employees of the organisation. The main objectives of the PSA employees were to produce correct salary outputs for the company and to prepare salary documents on time. In order to achieve this, more than 100 job tasks had to be performed in a cyclic manner each month. These tasks included the registration of new appointments, personnel data administration, sick leave administration, registration of working hours and different types of contracts, pension management, supervision of financial projects, administration of insurance data, modification of personnel and salary information, administration of declarations, and the registration of internal promotions.

These were primary tasks for all the employees in this department. The task results were extremely important for Medinet as a whole, and for each individual worker. Usually the staff followed a schedule in which the tasks for a given period were divided in such a way that everybody performed them in a cyclic manner. The level of individual responsibility was very high since any mistakes could lead to financial inaccuracies. The staff entered various salary-related data into the system (insurance, sick leave days, expenses declarations, vacation days, and transport). Then, during a specific week in every month, they processed these data. Following this, all the data were automatically sent to an external governmental salary system that finalised the outputs and transferred money to the employees' bank accounts. All the PSA employees benefited from their colleagues working reliably and responsibly.

Tasks and responsibilities of the decentralised users

Decentralised users, being part of the Social Affairs department within the Strategic Centre, were responsible for the development, testing, implementing and monitoring

of local HRM policy in their individual departments. They implemented the central HRM strategy, but at the same time created and developed internal HRM rules and norms within their own units. The primary tasks of the decentralised users included managerial tasks such as creating an internal policy for human resource development or staffing, and the routine HR administrative tasks were not as fundamental to their tasks as with the PSA employees.

Our investigation involved 19 HR managerial employees who participated in the pilot project for Beaufort implementation from four different departments.

The main tasks of these local personnel managers were to advance HRM policy and personnel administration within their departments. As was noted earlier, personnel information administration was a secondary task for the decentralised users. In two of the departments, those tasks were performed by the managers themselves, and in other two departments by other employees (secretaries or specific workers).

The administration tasks to be performed using Beaufort were important but considered as secondary, and even as tedious and dull, within the general field of personnel management.

4.3.4 Software experience of the users

All the PSA members were used to working with IT. Since 1990, they had been using software for salary administration. Before Beaufort was introduced, they had worked with the IT salary system Prigem, also a product of Getronics.

The software experience of the decentralised users varied, sixteen of the nineteen were familiar with working with IT. In one of the departments, they had even introduced a self-designed HR system some years earlier. The decentralised users in one department were not used to working with the computers at all.

4.3.5 Intention of Beaufort for the users

The plan was to introduce five basic Beaufort modules to the PSA specialists: salary administration, time registration, sick leave administration, personnel management, and a report generator. The introduction of these modules aimed at supporting the main tasks of the PSA employees.

The introduction of Beaufort did not require changing the content of the PSA job tasks. Due to the technical advantages of the system, many tasks were expected to become quicker and easier. Beaufort also offered the automation of tasks that were previously done manually (for example, historical overviews of various data).

Ultimately, 82% of the PSA employees used Beaufort both very actively and frequently. Once in use, there was a very real need to continue using it since all their tasks were performed using the various modules in the system.

On the contrary, introducing the new IT did necessitate changes in the way standard tasks were performed by the decentralised users. Firstly, instead of completing forms

and sending them to the PSA department, the decentralised users had to make inputs electronically and share the information with the PSA specialists and other decentralised users. Secondly, the content of inputs had to change: the managers had to understand various legal aspects of registering working hours and salary administration. Thirdly, the responsibility for such inputs had to be transferred from the PSA specialists to the managers. Any mistakes in inputs could lead to financial complications for the department concerned and for Medinet. Fourthly, decentralised users had to establish new collaborative links through the system: with the PSA specialists and with the decentralised users in other departments.

The usage intensity of the sick leave administration module by the decentralised users was not high: inputs were made on average only three-five times per week. The intensity of time registration module usage was moderate: once a day.

4.3.6 Agreement about Beaufort implementation and employees' participation in the project

The project team involved future Beaufort users from the PSA department in the implementation process in order to mitigate against certain risks. Mostly the participation amounted to no more than informing future users about the project:

> "The managers told us about all their plans regarding Beaufort. We were regularly informed about all the coming changes and new ideas. After their meetings at the management level, they used to tell us about their problems…" (Jan, PSA, P-1).

The employees of the PSA department were thus regularly informed about all events concerning the Beaufort project. In fact, they participated in all stages of the project development as 'information-keepers'. They were told the news about future changes related to the new technology, managerial plans, the intention of the system for the whole company, and ongoing progress with the project. They accepted the information from the managers and agreed upon future changes without actively participating in the decision-making. They did not take advantage of the opportunity to discuss and give advice about requirements analysis and the development of the functional demands of Beaufort before its introduction.

We can say that PSA's participation in the project implementation did not become active until the stage of testing the system.

Decentralised users participated in the implementation of Beaufort more actively than the PSA department. Some of them were members of the steering group for the project, and actively took part in the development and implementation of the new system. Two of them were involved in the decision-making over the choice of a new system. Most of them took part in the analysis of the requirements and the functional demands of Beaufort for the entire company. None of them, however, participated in the functional design of the system in terms of their individual end-user needs. They discussed future HRM changes and gave advice to the project team on possible ways of improving implementation. They were also involved in the PSA department's development of the Beaufort project plans. The managers fully agreed with the idea

of introducing Beaufort, and they were enthusiastic about the main aim of Beaufort: to improve the HRM processes in Medinet:

> "I am quite interested in the system and believe it has a lot of possibilities. I am looking forward to the situation when we all will work in the Medinet network. It is so interesting to generate documents such as working schedules and overviews of our production for the whole company" (Michiel, decentralised user, P-20).

4.3.7 The groups of Beaufort users: summary

Summarising this section, we would remind the reader that the development of a group might well be a prerequisite for group learning. We have found that the two groups of Beaufort users had two differing and even opposing group characteristics. The PSA team was formed about three years before the Beaufort project and therefore had its own history, norms, and traditions; and most members were fairly open-minded. The group of decentralised users had to be formed to coincide with the system introduction: they had never worked together before, and they did not know each other.

In the PSA group, the job tasks targeted by the system were highly significant for the employees. The members of this group were mutually interdependent in performing their tasks. This reciprocal interdependence was clearly defined for the users and operationalised within the department.

The group of decentralised users had the opposite characteristics: the tasks that they had to perform with the system were not that significant for them, the members were used to working independently, and they were even valued for that ability. Working together across the entire organisation meant that they had to build associated task interdependence, and this required close collaboration within and across departments.

Software experience within the PSA group could be characterised as adequate and fairly even across the group. The decentralised users had different software experiences–from a total absence to a software design level.

4.4 CHARACTERISTICS OF THE TECHNOLOGY

In December 1999, the Beaufort system–a Getronics' product–was chosen on the grounds that it met the various functional demands of Medinet.

Getronics is a Dutch software company with its main base in Amsterdam. The company offers IT advice, design, development, implementation, and support in the field of Infrastructure and Business Solutions. The clients of Getronics can largely be found in market segments such as finance, retailing, telecoms, utilities, healthcare, government, and accountancy. In the Netherlands, the company has become famous for its HR electronic solutions that offer a range of technological tools for personnel management including information planning and management, organisational structuring, implementation of HRM systems, business intelligence, and career development.

In this section, we will describe the system from the perspective of our theoretical framework. Firstly, we will clarify the intended role of Beaufort in Medinet, and show that it was rather difficult for the targeted users to fully understand that goal. Secondly, we will specify the technical properties of the system and, after this, we will examine the ways and types of collaboration offered by Beaufort. We will demonstrate that Beaufort is a complex, module-based system, with the possibility to support multifaceted task interdependency.

4.4.1 The role of Beaufort in Medinet

The document analysis has shown that no definitive Beaufort goals were determined prior to its introduction (Fehse, 2002). The Beaufort project's strategic plan (January 2000) contains some information about the reasons for its introduction at Medinet. It states that the introduction of Beaufort was aimed at improving the efficiency of processing HR administrative data, simplifying access to strategic information, and improving the protection of sensitive personnel information.

We did not find congruency between this aim and the role of Beaufort as perceived by the project team members. The categorisation of their statements shows three main goals in introducing Beaufort:

- To increase the efficiency of personnel administration by restructuring the HRM processes: from a highly centralised approach to a decentralised one. The decentralised users were expected to directly carry out data processing using the system.
- To create shared information files, leading to the use and exchange of personnel information among decentralised users.
- To incorporate all the various personnel information systems in Medinet. Originally, there were several different information systems that used personnel information: the internal telephone system had its own small information system with the names, addresses, and telephone numbers of employees; the 'clothes' department worked with another small information system, etc. Often, for various reasons, the same employee had different data in the various subsystems. Beaufort was supposed to be a central personnel system, which would provide other systems with any necessary data.

We did not find congruency between this and the interviewees' understanding of Medinet's official goals with Beaufort. When asked why the new technology was introduced in Medinet, the interviewees replied:

> "We hope to restructure the administrative flow of work with the help of Beaufort, from a centralised to a decentralised manner. Now, nobody in the local HRM offices uses Beaufort…if there are any personnel questions they are used to calling PSA to get the information from the system…" (Olaf, the project leader, P-23).

> "In the current situation, four different people are involved in inputting the personnel data in order to administrate a salary: an HR manager from a department, their secretary, a PSA staff member, and a PSA administrator. If all the people make mistakes, it can take a lot of time to discover them, and then to correct them. However, using the system changes this as only one employee would be responsible

> for that input, which in fact decreases the overall possibility of mistakes" (Paul, a member of the project team, P-25).
>
> "Managers wanted more information, but the previous system could not provide this. I think with Beaufort it will be possible to retain the information about educational levels, career status, health issues. It is important for the managers" (Mark, PSA, P-5).
>
> "The goal of introducing Beaufort is clear. The company will earn more money with it. Nowadays, for example, a task is being performed by five employees; in the future, the same task will require only three employees. It saves money" (Jan, PSA, P-1).

These quotations demonstrate the wide range of understandings of the goals of the technology in Medinet. It seems that the interviewees did not express the view that the system might help them to improve their job performance!

4.4.2 Specification of the system

It is a module-based personnel and salary administration system that contains technical options for publishing, composing, structuring, improvisation, and storing personnel data. There are seven modules which users can use in administering documents: Personnel Management, Salary Administration, Sick Leave Administration, Formation and Organisation, Time Registration, Office Link, and Report Generator (Table 4.3).

The basic module is Personnel Management, through which users input and update all the information concerning personnel data. These inputs do not require specific coding as they are registered using 'normal' words.

The Sick Leave Administration and Time Registration modules are very important in salary calculation. All inputs to those two modules have to be coded using special numbers, with three to five digits. A change in the codes might indicate changes in working conditions (for example, less or more working hours per week, or emergency working hours, or differences in types of sickness including professional sicknesses) that will automatically adjust the salary in the Salary Administration module.

The Salary Administration module also requires codified inputs. The users (salary administrators) combine a range of personnel data in this module (such as sick leave days, participation in the optional schemes for fringe benefits, flexible and emergency working hours, professional qualifications, and medical authorisation). Any small mistake in the numerical input will lead to an incorrect salary for an employee.

Beaufort's Formation and Organisation module provides the structure of the company in a hierarchical manner: sub-departments and units, clusters, and divisions. It gives an overview of the whole company and allows one to "see" the working place of any employee. Only Medinet's IT department was authorised to make changes in this module and update the information; other users could only read it.

Office Link is a special HRM module that allows HR administrators to send letters to employees using mailing lists within Medinet, for example to a certain department, or to all nurses. Such letters may concern a range of personnel information–changes in

work contracts, invitations to special events, updates to labour conditions, or other information.

Module	Users (authorised to make inputs and outputs)	Specification
Personnel Management (PM)	Decentralised users (inputs) Cluster managers (outputs) PSA department (outputs)	Registration of: Personnel data: name, title, address, family status, date and place of birth, employee number, type of contract, department and function, special authorisation issues, participation in fringe benefit options, etc. Career development data: educational background, professional experience, ongoing professional development (courses, education, etc.). Social activities. Inputs are not coded.
Sick Leave Administration (SLA)	Decentralised users (inputs) PSA department (outputs)	Registration of absence (total or partial) due to sickness, and notification of this absence to the various external administrative bodies related to the social security system in the Netherlands. Inputs are based on the date, type of sickness, necessary treatment, pregnancy, frequency of sickness, and relationship with the occupation in the hospital, etc. Inputs are crucial for salary administration. All inputs are numerically coded.
Time Registration (TR)	Decentralised users (inputs) PSA department (outputs)	Registration of working hours in accordance with the Collective Agreements for Dutch Hospitals (registration of weekend and holiday working hours, emergency hours, day and night shifts etc.). Inputs are essential for calculating monthly salaries. Inputs are numerically coded.
Salary Administration (SA)	PSA department	Operating on all the inputs from the other modules in order to calculate salary. All inputs and outputs are numerically coded.
Formation and Organisation (FO) Office link	Cluster managers (inputs) All users (outputs) Decentralised users	Detailed picture of the organisational structure and employees within the hierarchical order: divisions, clusters, departments, subdepartments, sub-units, etc. Administration of various types of letters to employees (invitations, congratulations, bulletins, etc.)
Report Generator– "Informer"	All users	Creating non-standard reports.

Table 4.3. Description of the functionality of the Beaufort system

4.4.3 Enabling collaboration

Beaufort enables two types of collaboration.

1. Within the PSA group of users, the system has the characteristics of intensive groupware and supports *reciprocal* interdependence. There are strong direct interactions between the employees through the system. Every user within a unit makes inputs to one or several Beaufort modules. This information is held in the database files within a certain module and so colleagues responsible for producing a final document can use this data.

For example, in order to process the salaries for a unit in Medinet: a PSA employee inputs the data concerning 'sick' days for every person within that unit; another employee inputs the appropriate insurance types; a third, the working hours; and the fourth, any changes in the personnel data. These tasks can be rotated as all the group members are qualified to handle all of them. The registration of working hours is dependent on the sick leave information, the insurance administration on changes in personnel data, and other interdependencies also come into play. At the end of a month, one of these PSA employees has to calculate the salary for each employee based on all the inputs.

2. Beaufort also has the characteristics of multichannel groupware and supports *associated* interdependence. The complex flow of inputs and outputs, and data storage are enabled by the system across all the departments in Medinet. This facilitates the decentralisation of personnel administration. This feature of Beaufort is considered as one of its main strengths. Personnel data are entered locally in each department and in the PSA. The information is shared and made available to authorised users across the company.

Not all Beaufort users in Medinet interact directly through the system. However, their inputs are crucial in generating documents across the company. For example, decentralised users in the laboratory, kitchen, and intensive care departments make inputs to the Sick Leave Administration module. A PSA employee processes these inputs and completes the salary administration. Another example concerns employees with flexible contracts who work in more than one department: through Beaufort, decentralised users can collaborate and share data about such an employee in order to administer the personnel information. (There are about 500 flexible workers in Medinet).

4.5 ADOPTION OF BEAUFORT BY THE USERS

We will describe the adoption of Beaufort for the two groups of users in two distinct subsections. We first portray the processes involved, and then we rank them in accordance with our operationalisation scheme. Then, we will summarise the most important aspects of group learning in the Medinet case study.

Adoption of Beaufort by the PSA department

We describe the group learning processes based on the discourse analysis of the interview transcripts and field notes.

Collective acting

The PSA employees expressed the view that they were active and busy with operating four basic modules of Beaufort: Sick Leave Administration, Time Registration, Salary Transactions, and Report Generating. For them, these activities had become routine and were based on replicating instructions for using the system. They worked with these modules throughout the working day as they expressed in the interviews:

> "Sometimes I try to play with the system–to find something interesting in it… But most of the time I am so busy with 'normal' routine operations in Beaufort–from 9:00 until 16:30–there is no time for anything else…" (Annette, P-7).

> "What am I doing with Beaufort? Working with its screen 36 hours per week…" (Remko, P-12).

Searching for new techniques and possibilities in Beaufort were exceptional activities according to the users. Two PSA members were officially assigned to search for new procedures in the system in order to look for more efficient ways of working and administering the data.

> "I was busy with testing the time registration module for the departments. The goal of that test was to investigate the possibilities in the system of combining the registration of two jobs for one person. If somebody has two jobs in Medinet, Beaufort must identify this in order to administer the salary. It was very difficult… It took me from November 2000 until May 2001. And if at the beginning I thought that it would be impossible, after my exploration I did manage to make some changes in the system and come up with a positive conclusion" (Marcia, P-14).

Others were involved in such use occasionally, to meet specific requests concerned with new ways to generate reports (in the "Informer" module).

Group reflecting

The PSA employees were used to reflecting upon their experiences with the system. Every morning they discussed different problems in the ongoing use during special sessions. Also informal discussions took place, we found out that before a formal session the employees often took the chance to talk with each other about their difficulties with Beaufort. They had special notebooks in which they noted every nuance in Beaufort that they wanted to discuss collectively. It led, for example, to a long discussion about rules for sending the salary data away. Below are some sample supporting quotes from the interviews:

> "Even before Beaufort was introduced we exchanged our 'scary' expectations–many of my colleagues were afraid of it, they did not know how to encode all the information about salary payments. I would say that for some of PSA members it was really difficult to change the way of working" (Mathijs, P-9).

> "We used to discuss our current problems with Beaufort every day, and most of the time we discussed them in an unofficial way, with each other" (Ine, P-8).

Initially, the system used to make unexplainable errors (for example, mixing numbers up or miscalculating working hours). The employee who first spotted this immediately pointed out those errors. They also compared Beaufort with Prigem in order to "feel the new system better", and they saw a lot of advantages in Beaufort. Everybody felt free to declare their

individual difficulties and lack of skills in the use of some modules, especially "Informer". They knew that others had difficulties in operating with the system:

> "I think I was the person in our group who had most of the problems. I came a bit later to the department, and that is why every day brought me new difficulties. But I felt comfortable to talk and ask about this" (Annette, P-7).

> "At the beginning they used to ask how to operate with this tool, how to print the document out, how to make different reports, etc. There were too many questions…" (Esther, P-3).

> "I think that the major problems we had at the beginning were that people were afraid of the system, they were afraid whether they were right or not. However, the strongest issue was that they were not 'shy' to talk about this. We all discussed our difficulties with Beaufort and laughed about it…" (Harry, P-10).

Knowledge disseminating

'Advanced' members, those who had greater skills in software use, demonstrated difficult operations related to generating new reports and using the "Informer" module. One of them led two sessions on how to use the "Informer" module. She created the content of these sessions herself, based on her own experiences. Another person developed specific manuals for internal PSA use about tips for time registration. They felt themselves to be responsible for providing the whole department with new ideas.

> "I am responsible for explaining the "Informer" module and making it clear for my colleagues. It is not easy, but we have already had two sessions–I taught them…" (Karin, P-4).

> "I taught my colleagues about transactions in Beaufort. … we still keep our lessons recorded" (Mathijs, P-9).

> "E[…] showed me this morning how to use an option within "Informer". When somebody shows you such things, it always seems to be easy to apply…" (Ine, P-8).

In everyday usage there was a tradition of showing one's closest colleague new possibilities (operations) in the system and helping with difficulties.

> "Everybody had problems at the beginning with sending out the salary documents to A[…]. It also took me some 'thoughts' to work out how to do it. I had some skills as I had worked with the same system before. I was very glad to find the solution and I decided to create a small manual on how to operationalise that function. I think it helped my colleagues a lot" (Jan, P-1).

> "In our team, a colleague of mine is very good at computers. And we simply exchange our knowledge: we contribute to each other in this way so that he helps me with the computer knowledge, and I help him with the content functional knowledge" (Harry, P-10).

Sharing understanding

All the employees shared a similar opinion about the goal of the system. They viewed Beaufort in a similar manner and noted the same positive and negative points. However, they viewed the purpose of the system differently from its real purpose. They shared the opinion that Beaufort was introduced simply because the previous system was old. Just three employees saw the goal of the system as being connected to the restructuring of the HR information in the company.

They could not recall any personal need in the system introduction, and could not even formulate that idea. They understood the services offered by Beaufort but they mentioned that it was a complicated technology that required a lot of efforts to understand and get used to.

They realised the advantages of Beaufort in comparison with the old system. While working step-by-step with Beaufort they became convinced of the advantages of the system such as the

possibilities of providing the clients with quicker and just-in-time administration services (for example, during telephone calls or during meetings), of composing more complex personnel reports (with complex matrix schemes), and of generating historical overviews from the year 2000 onwards without having to resort to manual work in an archive:

> "Almost anything is possible now through Beaufort. For example, even if you need a list of employees born in 1975, in order to arrange 25 year birthday events, it is possible. I am glad about this" (Jan, P-1).

> "Beaufort has a lot of possibilities. One problem is that it's not always easy to realise and use, but I am sure that with the system you can do more varied and complicated tasks. At the same time I am not sure if it is necessary to have all these possibilities" (Karin, P-4).

> "Actually it's a good system. It works better than Prigem and it helps me a lot. It works very quickly. When somebody comes to me with their own salary problem, it's now so easy to find out the information, and to show the documents to the employee. I can switch from one file to another and get the right information directly from the computer, and just-in-time during a conversation" (Mathijs, P-9).

They thought that the content functionality of Beaufort still had room for improvement: that there was a need to adapt it more to the hospital environment and make it possible to have historical overviews from before 2000, to improve registration of working hours for the part-time employees, to improve the speed of working with the "Informer" module, and to improve the financial administration of the fringe benefits.

> "In the time registration module we lack very important items such as the title of the department. We can see on the screen only the number of the contract and the personnel number, and not the department; such information is very important because every department has its own codes in our system" (Karin, P-4).

> "Looking at historical overviews is not simple: you can do this only since October 2000; if you are interested in earlier periods you have to look at Prigem or to go to the archive and work with paper" (Esther, P-3).

> "There are several financial options in Medinet that were started years ago. I think that almost 80% of employees take part in project [A]. The problem is that the system doesn't deduct the necessary money from the salaries. Currently we do it manually" (Martha, P-11).

> "There are employees who work 3-4 days in a week. If they are sick, Beaufort creates their salary as if they are sick 5 days a week instead of their real working days. It is a very big problem because we cannot improve the situation, even by hand" (Walter, P-13).

They were enthusiastic to go on with Beaufort for themselves, within PSA, but they were very negative concerning implementing the long-term goal of Beaufort–future use across the whole company. They saw that idea as unrealistic. During the interviews we noticed that this topic was very sensitive–all 17 respondents wanted to express their views. We provide some examples:

> "Actually I don't believe in a very successful implementation in the whole of Medinet. This is too interconnected with responsibilities and attitudes of a lot of people …" (Ine, P-8).

> "What will be the result of implementing Beaufort in the whole company?… I don't know. It's not very easy. We have rather different interests among all the potential users: we are interested in creating correct salary information, and not only in sharing the information through the system" (Hanny, P-6).

> "In my view, it is not a good idea to introduce Beaufort to all departments. Decentralised users will make mistakes and nobody will be able to correct them. Now they make a lot of mistakes on paper and don't spot their mistakes. For example, they write "April" when they mean "March". But now we are able to control the situation. Once it is already on-line, I think, it will be too difficult to change anything" (Annette, P-7).

> "We discussed the future plans... I would like to stress that now I am talking not about my personal opinion, but about our opinion–of several PSA members. We are sure that with the health administration module we will meet enormous problems" (Martha, P-11).

These expressions show that the main reason for the PSA employees to doubt the implementation of Beaufort to the decentralised users was the lack of clear divisions in the responsibilities for the salary administration between the PSA and decentralised users in the new 'post-Beaufort' situation. It was not clear who would be responsible for the final on-line inputs, how these would be controlled, to what extent the PSA tasks would be transferred to the line managers, and who would be in charge of dealing with employees' complaints.

Mutual adjustment

Four employees always took part in the activities aimed at establishing agreements within the PSA department concerning Beaufort. There were suggestions to organise instructions on the use of the "Informer" module, and the employees arranged that themselves. One suggestion was to organise a working schedule for operating with the "Informer" module:

> "Yesterday, when the files had to be sent out, the system worked very slowly. It was really too slow–you had time to have a drink or to relax after you pressed a single button. Usually Beaufort works slowly when somebody is working with the "Informer" module. Indeed I discovered that somebody from the project team [in another building,–T.B.] was working with that module. I was very upset because we are not allowed to delay transactions with the salary documents. I have already proposed to have a sort of a working schedule for using Informer" (Mark, PSA, P-5).

They were proposing special intradepartmental rules on operating with Beaufort. Thus, a new 'working plan' for coupling tasks was applied based on the proposal of one of the employees. They had many suggestions on how the system could be improved, but these ideas were generally not implemented. For example, there was a proposal from many users to have the missing codes of various departments put in the module for time registration. However, it remained only a proposal.

New group agreements on regulations about the use of Beaufort were not initiated. Such agreements remained based on existing informal intradepartmental rules. For example, the employees 'transferred' the tradition of entering time registration data from the old way to the 'Beaufort way'. The system allowed them to make time registration inputs every day, but they continued doing it only once a month in accordance with the implicit PSA rules.

Adoption of Beaufort by the decentralised users

We will now describe the group interaction processes among the decentralised users in a similar manner to that used above for the PSA users.

Collective acting

The decentralised users were active with making inputs on average 2-4 times a week, and not more than 40-60 minutes a day. All the inputs were similar and involved only two modules. They did not search for new techniques in the system. Only one of them was asked to examine time efficiency using the "Office Link" tool, others were waiting for the results of that test without making any inputs for one month. They followed only the instructions they got during the introductory session.

> "I use the system in the morning, between 8.00 and 9.00, mostly just making some inputs about those employees who are sick. Usually it's 3-4 times per week" (Tom, P-32).

"I don't make many inputs… Last week, five inputs" (Lisa, P-33).

"Now I am busy with ~ one mutation a week…" (Pieternel, P-31).

"One secretary from another cluster is now involved in the process of testing this module, but she is not happy with that" (Ben, P-22).

Group reflecting

The decentralised users did not communicate about the use of Beaufort with the aim of understanding it better. There were no attempts to broaden the contacts and talk with other users within this group. Any conversations were mostly aimed at 'copying' operations.
Discussing errors took place only within one department and there only once. It was related to the situation when Beaufort used to mix up the names of months in the output documents and the employees then had to correct them manually for two months. But even that experience was not discussed across all the decentralised users:

> "By accident we completed a working month in the middle of the calendar month in the system. As a result, we got the wrong month: instead of April, we got May in the system. But it meant that during three months–April, May, and June–we had to complete all invoices by hand. Nobody could resolve the situation. It was really terrible" (Merel, P-29).

Individual difficulties were also declared only at the level of the department, and not across the whole decentralised group. Such individual difficulties were mainly related to the users' uncomfortable feelings regarding the system.

Knowledge disseminating

Knowledge disseminating took place between the PSA specialists and the local departments, but not among the local departments. The decentralised users waited on external help from the PSA, but did not try to externalise knowledge themselves.

> "When we had an introduction lesson, a colleague from another department came to show us how to manipulate data with this module, but it was only once…" (Merel, P-29).

> "At the beginning I tried the system together with one of my colleagues. I suggested that while one of us was on the phone with the person from PSA, the other observed the process of inputting the data" (Pieternel, P-31).

There were no proposals regarding the usage of Beaufort in a decentralised manner, only suggestions NOT to use it.

Sharing understanding

The decentralised users understood correctly the idea behind Beaufort. They noted that it was introduced in order to reorganise the process of HRM registration, but they did not perceive any individual needs in the new system:

> "I would like to emphasise that we think that the system is not that bad, but you must be clear for whom it is essential, and for whom not. In my situation, I don't see an urgent need to computerise my tasks" (Lisa, P-33).

> "They promise us our work will improve with Office Link: we will be able to send a similar letter to 25 or more employees at once. It sounds really great, but … we don't need it. Our work requires an individual approach to every person. And another point is that our cluster does not have nurses, there are only specialists. It means that it is impossible to duplicate any letter to all of them" (Michiel, P-20).

> "We use it because we have to do it, but I don't think it has any benefits for us, especially in terms of time. They told us that we would just have to press one button before we go home and the computer would do the rest overnight. But it has not happened yet" (Sanne, P-18).

They understood how to operate with the modules but found them unreasonably complicated. They found that the system was not protected against incorrect inputs and that this could lead to crucial mistakes. They doubted whether the system could replace their HR work. They did not see strong reasons to make much effort to adopt it. Generally, they considered Beaufort as potentially useful, but were disappointed that it did not meet their expectations:

> "When you look at the system for the first time, it's too difficult to see how to proceed. I would say it is not very user-friendly; there are so many screens you have to go through before getting to the right information. I have five screens for one procedure" (Ronald, P-19).

> "I did not believe in such a story about Beaufort, even at the beginning, because our work is always implies cooperation with people. Systems cannot make individual contacts. I find it utopian that pressing buttons on a keyboard is enough to solve social problems" (Sanne, P-18).

They were very pessimistic over the future use of Beaufort. Their main concerns were about unexpected new tasks and their increased financial responsibility for the outcomes of the system:

> "Now we have to input the data, not only the registration of illnesses and working hours, but also its function in influencing salary. Salary administration terminology is not familiar to us... even after our inputs, the PSA department has to develop the information further, I think it's quite complicated" (Beike, P-17).

> "We are involved in the pilot, and it means additional work and trials. I can say that personally I do not need Beaufort. I am sure it is necessary in order to integrate the whole company" (Sanne, P-18).

Mutual adjustment

The managers proposed improvements to the manual: they wanted it to be operationalised in a "what…if" style:

> "Getronics provided us with a full manual on how to use the system. However, it says nothing about the content of our tasks. At the same time, in Medinet, we ourselves do not have official written documents with descriptions of job tasks. Everything is in employees' heads. They have been working in well-established ways for a long time. Nobody has ever asked why they do so, who decided this, etc. However, now we really need structured documents with descriptions of all procedures, otherwise it will be chaos" (Olaf, the project leader).

Being disappointing with the Beaufort experience, the users organised evaluation sessions for themselves, without involving the project team. In two departments they took the initiative of writing a letter to the project team addressing all their difficulties and problems regarding the use of Beaufort. In reality, all their activities were oriented towards blocking the implementation of Beaufort.

4.5.1 Group processes: summary

We observed two opposite group learning processes.

The PSA employees operated with the system very actively in the performance of their day-to-day tasks. Mainly this involved running the basic modules, while searching for and testing new techniques were rather exceptional events. Group

reflecting among PSA members was mainly related to discussing problems about use of the system, and declaring individual difficulties. Advanced users who stimulated, proposed, and demonstrated new ideas with the intention of improving the usage of Beaufort focussed their knowledge disseminating within the PSA. In terms of sharing understanding, an interesting finding was that all users had similar ideas concerning the role of Beaufort, but that these did not adequately reflect the real intention of the system. There was no emergent need to introduce the system; however, a realisation of the needs in Beaufort became obvious while working with it. Mutual adjustment was related to arranging further learning activities and suggestions concerning improvements to the system. Some employees initiated and developed regulations to apply new rules of working with the system. However, it took lengthy discussions and efforts to achieve this.

We have graded the group learning processes in the PSA department as follows:

- Collective acting–moderately active
- Group reflecting–moderately strong
- Knowledge disseminating–moderately intensive
- Sharing understanding–moderate
- Mutual adjustment–moderate.

The decentralised users operated somewhat differently with the system. They did not search for new possibilities in Beaufort, and only worked with it based on the given instructions. Some discussions took place between colleagues within one department, but not across the whole group. The issues did not concern the possibilities of improving the usage, but rather the generally negative 'feelings' about the system. There were no attempts to externalise the ideas to improve the implementation process. Suggestions were about the cancellation of the project. The users understood the goal of Beaufort for the company, but did not see any needs in it for themselves, and even found the project unreasonably laborious and demanding. The functionality of the system did not attract them. Activities aiming at collective agreements were oriented towards blocking the project.

We have evaluated the group learning processes among the decentralised users as follows:

- Collective acting–passive
- Group reflecting–mostly weak
- Knowledge disseminating–fuzzy
- Sharing understanding–low
- Mutual adjustment–mostly weak.

In comparing the group learning processes in the two settings, we see some important differences. After the introduction of Beaufort, the PSA department did not see its immediate relevance for their tasks and it was not very easy to work with. However, quite soon, the usefulness of the system outweighed the operating difficulties and people showed their readiness to invest efforts in mastering it. The users started to discuss Beaufort and convinced each other that it was a helpful media that could increase their performance. This opinion was strengthened during the meetings and instruction sessions. The group processes thus directed the understanding of the technology and its acceptance.

The decentralised users also discussed Beaufort, but they convinced each other that the system was not useful and even detracted from their performance. This negative opinion spread very quickly across the entire group and made people–even those who did not try to operate the technology–believe in the uselessness of Beaufort. Nobody wanted to invest any effort in learning the system. All the five group learning processes went in the direction of disliking the system.

4.6 MANAGERIAL SUPPORT

Now we will consider the support given to the end-users by the project team in Medinet. We shall follow the operationalisation scheme and look at the managerial support from five perspectives: authority and responsibility given to the employees in their use of Beaufort; availability of different learning opportunities (formal and informal) to practise with the system; the level to which learning and use of Beaufort were recognised and rewarded; willingness of the managers to help and support the end-users; and time allocated to exercise with the system and discuss difficulties. After the descriptions of these managerial support issues for the two groups of users, we will apply qualitative labels based on our operationalisation scheme.

Managerial support for the PSA department

The analysis of the discursive data (interviews and field notes) concerning managerial support for Beaufort implementation in the PSA department led to the following descriptions.

Autonomy and responsibility

The PSA employees were strictly limited in their freedom to explore the system, and were led by the project managers in learning the system. The users were unable to make choices over participating in educational courses, peer guidance, and experimenting with the system at the beginning. They were not always informed about all the changes in the Beaufort project. The users expressed the view that they lacked the basic information about the project and felt they were only informed about the decisions, and did not participate in those discussions. There are some examples from the interviews:

> "Suddenly I was told to give lessons to members of PSA. I don't like it when you are just told to do this without your opinion being sought" (Monique, P-2).
>
> "They told us how to use the system, how the system thinks, but not why they decided to introduce the system. They were very excited themselves about the system and asked us to explore all its possibilities" (Jan, P-1).
>
> "We had a meeting with the manager, and he told us that some people must follow the course at Getronics. But why we should follow the course was not very clear" (Mathijs, P-9)

Their 'exercising' with the system was strictly planned and scheduled. However, taking the initiative was not forbidden: skilful and experienced employees took the decision to write manuals and arrange additional instruction sessions for their colleagues. Two employees were specifically asked 'to be creative' and to apply their creativity wherever possible: to search for new techniques. Others did not feel any need to be creative in their work with Beaufort.

Promoting different learning opportunities

There were many different learning opportunities arranged for the PSA employees. Six of them (out of 18) followed a 3-4 day training software courses at Getronics and then a special didactical course. This group became the centre for peer teaching within the department. For all the PSA members, systematic, well-prepared, instructions provided by their colleagues and experts were organised. There was a separate 3-5 hour training session for each Beaufort module. The content of the instructions was related to the technical issues of the system–how and when to make inputs and outputs. There was no need to provide the employees with the functional issues because their tasks were not changing. During these training sessions all the 'learners' had PCs and could practise with Beaufort during the 'lessons'.

There were three main reading resources concerning Beaufort use: the general manual from Getronics, the smaller manual adapted to the PSA 'environment', and regular information bulletins that provided job aids.

Peer teaching was active, three employees were responsible for consultations with their colleagues. On-line chat was aimed at exchanging experiences and ideas. There were three options for the employees to get advice: by telephone with a contact person from Getronics, 'direct' from the Getronics' consultant during the one month spent in Medinet, and an always available hot-line with the project team members which included technical specialists.

Feedback

Comments to the users on their use or learning of the system from the project team took place only in the event of negative emergencies: any mistakes made by the users were pointed out immediately and discussed. Sometimes the comments from the project team disappointed the PSA employees. There was no rewards scheme and the users were not rewarded or recognised for their efforts in learning the new system. During the interviews they recalled that it could have been a better experience:

> "I wish we were paid back for all our efforts we invested in understanding Beaufort" (Remko, P-12).

> "In my previous work place we had a lot of rewards when we were obliged to learn … But now I don't know, I am confused…" (Harry, P-10).

> "I worked the whole weekend at home preparing the instruction session for my colleagues… Actually nobody even paid attention to that" (Karin, P-4).

Management style

The project manager and all the project team members used to discuss with the PSA employees different issues concerning Beaufort. Their intention was to learn the system together. They acknowledged that Beaufort contained difficulties and were ready to talk about them with the users. They considered the users' ideas carefully, and at the beginning regularly. There was a rule for the users to describe their weekly experiences and the managers always studied their notes.

At the same time, it was difficult for end-users to convince managerial employees to accept some of their ideas. For example, a proposal about the introduction of the sick leave module to other departments was met with two months of debates between the PSA and the project team. After the lengthy discussions each party still kept its initial opinion. Further, the project team considered any negative attitudes by the PSA employees as no more than a kind of protest and resistance to any change.

Time

The training courses took place three months before the PSA employees were to face Beaufort in their work. By that time, more time was needed to recall the knowledge and skills acquired during the instruction courses. However, a space was not provided. End-users felt under time pressure during the early months following the introduction of Beaufort.

Before the introduction of Beaufort, the end-users were allowed two hours a day to practise with the system over one month. Their daily tasks however remained the same. They discovered that they needed more time to try out the system because the knowledge from the training courses was not sufficient. This exercising with Beaufort took place mainly in the September, and later they had to switch to the new system at once. They were not allowed to take days off during the first three months. Each day, from 10:00 to 10:45, they had discussions in a specific room in the department regarding different issues and individual experiences with Beaufort.

All the project team members had specific days and hours in a week allocated for meetings with the PSA users.

Managerial support for the decentralised users

This support is described following the same protocol as for the PSA employees.

Autonomy and responsibility

The decentralised users were strongly recommended by the project team to follow the instructions they had received because any errors in working with Beaufort could lead to mistakes in salaries or incorrect personnel information (such as incorrect lengths of sick leave). They were not allowed to make any inputs without a double check by the PSA department and the project team. Three comments taken from the interviews illustrate this:

> "Once I tried to investigate some options in the sick leave administration module, this caused a lot of problems. After that we were forbidden to experiment with it" (Rob, P-36).

> "Actually all our operations with the system are controlled. We cannot make any inputs without confirmation from the PSA department" (Tom, P- 32).

> "We wanted first to practise, but the project team took another decision" (Bas, P-27).

The users had to duplicate sick leave administration and time registration tasks: they had to continue completing paperwork in the old way and sending it to the PSA and, in parallel, they had to make inputs into the new system based on the new requirements. In Department [B], which had its own HR system, the managers had to triplicate these tasks: filling forms, inputting into Beaufort, and inputting into the local HR system.

Experimenting with Beaufort was forbidden because it could have resulted in financial chaos. Once the manager from Department [A] decided to make inputs into the sick leave administration module by himself without the PSA control. The next day, when the PSA specialist started to process salaries for Department [A], she discovered that four employees from that department had, by accident, been placed on long-term sick leave. This would have led to financial penalties for Medinet from the inspecting organisation. After that 'experiment', Department [A] was removed from the pilot programme. Below we quote from our interview with that manager:

> "Our operational manager started to work with Beaufort. He called his 'coach' from the

> PSA to input the data, and everything seemed to work fine. However, after ten days, our manager left for a vacation and I had to do it myself. I first phoned the same person in the PSA, but she was away. I decided to input the data anyway because I did not have time to wait. The next day they discovered a lot of mistakes in the system and forbade us to use it again" (Michiel, P-20).

Promoting different learning opportunities

Only one person from the whole group attended the course at Getronics about the "Office Link" tool.

> "Among all the decentralised users only one secretary was allowed to follow the course. It was a one-day course on how to use the compact page from Beaufort. Then an instructor from Getronics came to Medinet to teach us. We were taught in September, and when we started to use the system later, of course almost everything was forgotten" (Beike, P-17).

For the rest of the members of this group the first and main source of information about Beaufort were one-hour instruction classes provided by one of the PSA specialists. These took place in the individual departments. The main context of the instructions was related to the technical issues in using Beaufort, and not on the content of the new tasks that needed to be learnt and carried out by the decentralised users. During such training sessions only one computer was available which the instructor used in order to demonstrate how to operate the system. The 'learners' had to acquire and memorise the information virtually without any practical exercises.

> "In fact many people cannot work well without good instructions or help. It is always better to give attention to education as much as possible rather than leave people to sink or swim on their own, as occurred with us…" (Sanne, P-18).

> "We were ready to learn, but nobody taught us. First of all we needed to learn new functional tasks instead of how to press the buttons…" (Mariette, P-35).

> "Instructions are necessary, but instructions are not enough. It would be better, in my view, to organise normal traditional teaching processes in the classical way. In addition, the manual is very helpful, but teaching and exercising with various parts of the health administration system is necessary. Unfortunately we did not receive this" (Tom, P-32).

Among the reading materials available was the general Beaufort manual provided by Getronics and a 'sub-manual' from the PSA department. That sub-manual was part of the complete task description for the PSA and contained full information concerning sick leave administration and time registration (legal issues and information about inspections). However, they were not operationalised and defined for the 'new workers'–the decentralised users. For them it was not clear when to complete the data, what were the limitations, and what would be the outcome of any mistakes. The two quotes below express opinions on the manual:

> "The manual is far from being clear for us. It's just the usual sort of document developed by the designers. However, I need precise information for only my tasks. I don't have time to read hundreds of pages about everything…" (Lisa, P-33).

> "Our manual is not clear: there is s lot of information about the content of the PSA work, but I don't need this" (Ann, P-34).

Feedback

The employees felt a lack of feedback and that they were not being "paid back for their efforts". Comments on their use or learning of the system from the project team took place

only in the event of negative emergencies. The employees were not rewarded or recognised for their efforts invested in learning the new system. A rewards scheme did not exist.

Management style

The leaders continued to consider the users' ideas but it seemed only seriously when avoiding them could endanger the whole project. Thus, they tried to reduce the authorisation barriers after two HR secretaries raised the issue. They had looked into the possibility of signing personnel documents through the system but this was not allowed. In the old way of working, the decentralised users used to sign paper documents, but in the new situation it was not clear how, when, and who should add a virtual signature. The project team was confronted with the need to arrange e-signatures as soon as possible.

Another example of an 'emergency' was that decentralised users were used to sending information on paper to the PSA department every day. However, working with Beaufort required following a strict schedule–inputting sick leave information was allowed only once a month due to internal PSA rules.

The users were not happy with this as they wanted to do it in an easier way: i.e. as soon as they received information about sickness in their department they wanted to report it to the PSA.

Time

Some months after the training sessions, the decentralised users had to start operating the system. There was no specific time allocated for practicing tasks using Beaufort. All the everyday tasks remained the same, and time pressure was increased because the managers had to perform sick leave administration tasks twice: they continued with the old way of filling in forms and sending them to the PSA, and they had to enter the same data into Beaufort. Only one decentralised user allocated specific time to working with Beaufort–one hour in the morning twice a week. The rest operated with Beaufort in between other responsibilities. For many decentralised users the time pressure became even greater as they had to solve various technological difficulties at the same time:

> "When it was introduced, we indeed had a hard time. We were busy with different technological problems at the same time: learning a new version of Beaufort, the programme "Millennium proof", and our stand-alone version of Beaufort… It was too much. Even we had to file all the information manually, by hand, to ensure that people got their salary on time and correctly" (Anoek, P-28).

> "In my view, the decentralised users needed to practise a lot before starting to use the system. We, in the PSA department, did the same at the beginning… why not to have a stand-alone version on which to practise?" (Harry, PSA, P-10).

The project team members did not have specific days or hours allocated for meetings with the decentralised users, but they were easily accessible upon request.

4.6.1 Managerial support: summary

The descriptions above show that the managerial support for the implementation of Beaufort in the PSA department and for the decentralised users was different. It was adequate in the case of the PSA users, but missed many opportunities in the case of the decentralised users.

For the PSA users, there was almost no room to feel any responsibility for decision-making, planning, and creativity while adopting Beaufort. Every movement was pre-scheduled and prescribed. However, there were some employees who were 'appointed' to be creative and look for non-standard ways of practising with Beaufort. The users received adequate training and were provided with learning possibilities, including peer coaching, manuals, consultations, bulletins, and the Beaufort 'hot lines' through the intranet. The project management team was always 'available' for a consultation. All PSA employees could call directly to a specialist from Getronics with any questions concerning the use of Beaufort. Feedback was, however, disappointing. Day-to-day progress in getting used to Beaufort was neither commented upon nor recognised. The time allowed to take advantages of the system was sufficient: there were official hours to practise with the system every day and to make a gradual switch from the old to the new system, although it was not enough to fully learn the Beaufort system. Each day the PSA members had time to discuss any issues regarding their use of Beaufort.

Based upon the description above, we gave the following qualitative labels to the managerial support for the PSA employees:

- Autonomy and responsibility–moderate
- Promoting different learning opportunities–adequate
- Feedback–mostly weak
- Management style–moderately cooperative
- Time–sufficient.

The decentralised users did not have rights to plan their own work with Beaufort, or to make decisions about any inputs themselves. All operations to be made using Beaufort were under the strict control of the managerial team and were guided by the specialists from the PSA department. On average, the end-users in this group only had one hour of training instruction and that was provided by a PSA member. These sessions were oriented mostly towards the technical specifications of Beaufort and lacked information on the content and functionality of the new tasks which were transferred to the decentralised users. The manual was confusing than helpful to the end-users. There was no specific time given to the decentralised users in order to practise with Beaufort. Immediately after the brief instructions they were expected to operate with the new system, and to perform new tasks.

The qualitative ranking of the managerial support for the decentralised users is thus:

- Autonomy and responsibility–low
- Promoting different learning opportunities–poor
- Feedback–weak
- Management style–moderate
- Time–insufficient.

In brief, the managerial support for the PSA employees and decentralised users in implementing Beaufort can be characterised as top-down; users were strictly led towards the hopefully successful implementation of the system in accordance with a plan. There was inadequate feedback provided for both groups of users. The main difference was in the learning opportunities offered to the users: the PSA employees got effective instructions and other learning sources, including time allocated to

practise with Beaufort. The decentralised users were left on their own to cope with their huge problems in operating Beaufort and the consequential negative attitudes towards the system. The project leaders did not pay attention to the 'coming storm'– that spread harmful and depressing opinions about Beaufort across the entire organisation.

4.7 SUCCESS OF THE BEAUFORT IMPLEMENTATION

We have shown that the two groups of Beaufort users had opposite structural and non-structural characteristics; we have also demonstrated how difficult the technological features of Beaufort were. We have seen that group learning processes developed differently in the two groups: progressively in the PSA department and negatively among the decentralised users. Now we will assess the results of the Beaufort implementation. We will first discuss the efficiency of the project in terms of time, budget, and number of employees who got used to the system; and then we will look how skilfully and task-consistently the users operated Beaufort. As before, we will present the results separately for each group.

4.7.1 Efficiency

Based on the observations, and interviews with the end-users and the project team members, we conclude that the PSA members have adopted the newly introduced system with a high level of efficiency. All the employees got used to Beaufort within three months in accordance with the scheduled plan. The budget, planned for this part of the Beaufort implementation was also met.

The decentralised users did not adopt the newly introduced two modules of the system in line with the project plan. They struggled with the implementation process, as described above, for seven months, and finally decided it was time to call a halt. All the end-users shared the opinion that it was necessary to close the project until 'better times'. Therefore, the Beaufort implementation to the decentralised users was inefficient (or more bluntly–a failure).

4.7.2 Stable use

Stable use will be assessed using a two-dimensional construct as described in the research model: task-system fit and ease of use. Firstly, we will describe stable use of Beaufort for each group of users, and then we will summarise the findings on stable use and rank them according to our operationalisation scheme–from "high" to "low".

Stable use of Beaufort by the PSA department

The findings from the analysis of the qualitative data concerning stable use of Beaufort implementation in the PSA department is presented below:

Ease-of-use

The system was perceived by the employees as not difficult after the 'transition' period. They noticed that they did not have problems in working with Beaufort. They operated with the basic modules easily and quickly. Only one of the optional modules ("Informer") still required additional efforts to run. They also considered that further exploring the possibilities with Beaufort would not present difficulties:

> "I think I am used to Beaufort now. It means for me that I remember and realise what I am doing, I don't forget the different tools and options. I use as many functions as possible to get deeper information from different perspectives. It's not difficult for me now. I think I do it quite quickly" (Karin, P-4).

> "I am sure that there are no big surprises left for us, no longer any terrible secrets that could disturb our work" (Walter, P-13).

Although they were completely satisfied with the content of the interface, they were not enthusiastic about the structure of the interface: it contained a lot of screens and steps.

Task-system fit

After a period working with Beaufort, the PSA employees valued the system as helpful and advanced in supporting their tasks. Especially they rated highly the fact that all the personnel information appeared on one screen. They thought that they could perform their documentation and administration procedures faster than with the previous system. Below are four expressions from the users illustrating these points:

> "I use Beaufort every day and am sure that it is a very helpful system for my tasks. I need it to perform my tasks to create the required documents for the employees" (Remko, P-12).

> "I am able to see all the changes in the employees' personal files and select those employees who meet the criteria for any particular purpose. It makes my job easier" (Karin, P-4).

> "For the salary administration you can see everything you need at once on the screen. It is very comfortable to work with" (Marcia, P-14).

> "I have used the system for five months already, since October 2000. Every time it goes better. Of course, I don't know everything, but I can perform my job tasks quicker now than with Prigem" (Mark, P-5).

In addition, they also found it valuable that the system helped them in communicating with their clients (employees of Medinet): during telephone calls it was easy to find information using the PC, and there was no longer a need to hunt for pieces of paper.
There were no major changes in the routine for performing their tasks. The main chain of the PSA task flow remained the same:

> "Nothing is new concerning how we used to work, all procedures are kept the same, in the same order, the same steps. If you are busy with health administration, you have to go through the same steps to make sure that all the financial data is correct. I was really glad that Beaufort did not require changes in this procedure" (Martha, P-11).

> "Beaufort is not very difficult and even fun to work with. Actually the procedure of working is the same" (Esther, P-3).

Stable use of Beaufort by the decentralised users

Qualitative analysis concerning stable use of Beaufort implementation among the decentralised users led to the following descriptions.

Ease-of-use

Three decentralised users who were used to working with their own HR system did not find Beaufort technically difficult. They could quickly operate with the modules (under the supervision of the project team).
The rest of the group was sure that "completing forms was much easier than using Beaufort…"(P-34). They felt uncomfortable working with the system, and were even 'afraid' to start clicking the buttons without supervision and help.
They considered the screen as too complex, with many unnecessary items. The items on the tool bar and menu brought additional confusion. In order to make one particular input in the sick leave administration module they had to open five screens. Below are some examples of their comments:

> "When you look at the system for the first time, it's too difficult to understand. I would say it is not very friendly for users–you have to go through so many screens before getting the right information. Our own system is much easier: there are only two screens, while in Beaufort I need five screens for the same procedure" (Tom, P-32).
>
> "The most confusing thing seems to be the many different screens in Beaufort, which have to be opened one by one" (Pieternel, P-31).
>
> "After our inputs in Beaufort, the PSA has to develop the information further, I think such a way of using IT is unnecessarily complex" (Lisa, P-33).
>
> "I think, even paperwork would be easier than using Beaufort (Ann, P-34).

Task-system fit

All of the users were of the opinion that the system did not facilitate their tasks, but added additional tasks. They acknowledged the importance of Beaufort for salary administration, but did not find it essential that they participated in it. They stressed that time registration and sick leave administration were minor administrative responsibilities among their HR work, but the system forced them to pay too much attention to these tasks.
We provide some supporting quotes from the interviews:

> "These two Beaufort modules are crucial for the PSA employees, but we work not only with that information system, but also with another one for managing personnel in the departments. I don't see why I should invest a lot of effort in learning modules that automate tasks that are relatively not that important" (Lisa, P-33).
>
> "Despite being used to working with the HRM system, the content of this work has been changed. With Beaufort, we have to input data, which is not only the registration of illnesses and working hours–it also has the function of influencing the salary. Such terms as WAO, and CADANS–are not usual for us. I have a feeling that in order to use Beaufort we need to first change our job tasks" (Tom, P-32).
>
> "Sick leave administration is not my main job, and therefore I don't know the content of the inputs" (Ann, P-34).
>
> "Personnel administration is just a small part of my job tasks. I find it a very minor task. I

work in an office where everybody is busy with all kinds of personnel administration. Actually sick leave administration is too far from my normal job" (Pieternel, P-31).

The way of working also became more complex. The users had to duplicate their inputs: they did this electronically for the PSA to control, and in the old way on paper.

> "Currently we have to multiply the personnel information three times: we are still working with our own system, we have to learn Beaufort, and there is a need to keep on with the paperwork in order to check if the information is correct" (Tom, P-32).

The "Office Link" tool received a lot of criticisms for its functionality. Firstly, the users discovered the lack of the anticipated time benefits. Secondly, it was not very relevant because the managers hardly ever sent the same letters to many employees. Below are statements from two secretaries who were expected to work with Office Link a lot:

> " We were promised that Office Link would help a lot… In this module, you can supposedly just select a person and then what you need will appear automatically, or will be attached in accordance with the requirements. But it doesn't work yet. In fact there is no time benefit. We can type very quickly without such technological difficulties" (Beike, P-17).

> "So far, I don't see great advantages in working with Office Link. The time benefit of using Office Link is only about one minute. Why should I use Office Link?" (Sanne, P-18).

Further, the users even found the system lacked the data necessary to make inputs. For example, the "compact page" did not include information on types of contracts.
The system required changes to the usual way of performing tasks: new collaborative responsibilities, sharing of data, duplication or triplication of the tasks, and new scheduling for making inputs.

4.7.3 Implementation success: a summary

The PSA specialists had shared opinions that the usefulness and ease-of-use of Beaufort improved considerably. They shared perceptions about Beaufort's very satisfactory ease-of-use, especially regarding its main modules. The interface was perceived as not that simple but, at the same time, it was not difficult to operate. The system played an important role in supporting the execution of tasks. In general, all the tasks remained the same as with the previous system but the performance efficiency increased: less paperwork, greater flexibility in assisting clients, immediate availability of the necessary information.

This assessment has led to the following ranking of stable use by the PSA employees:
- Ease-of-use–moderately high
- Task-system fit–moderately high.

On the contrary, the decentralised users, after a couple of months of using Beaufort, did not achieve stable use, and their perceptions about the ease-of-use (or rather lack of) did not improve. The interface was perceived as unfriendly, with many screens and lots of unnecessary icons. Perceptions about task-system fit, or usefulness of Beaufort, remained low. They were of the opinion that the system did not facilitate their usual tasks, but brought with it the necessity to learn and perform new tasks which were not that important in their work.

On the basis of this, we qualify stable use of Beaufort by the decentralised users as follows:

– Ease-of-use–low
– Task-system fit–mostly low.

4.8 ANALYSIS OF THE MEDINET CASE STUDY

4.8.1 Trustworthiness of the case study

Before summarising the findings, we should discuss the "trustworthiness" of this case study (Lincoln and Guba, 1985).

We would argue that the quality of the data and information gathered is worth taking into account because of our:

- *Prolonged engagement* (Gardner, 1993). We were involved in the case study for almost ten months. This allowed us, in addition to the number of interviews, to come to an understanding of the culture of the departments involved in the research. We appreciated the trust of the respondents that was built up over the period.
- *Member check* (Lincoln and Guba, 1995). Transcripts of all the interviews were discussed with the respondents in order to verify the interpretation of the interviews was correct.

The quality of the findings and conclusions seem to be acceptable because:

- *Use of triangulation techniques*. In this case study, we combined various research methods. These were mainly based on qualitative techniques: interviews, field notes, and observations.
- *Discussions on the results*. We discussed the ongoing results with the project's steering group on two occasions, and once a month we had more general discussions with the project team and the head of the PSA department. A complete version of the case analysis was presented and discussed with the manager of the ConcernStaff of Medinet and the project team, and also with all the PSA employees.
- *Expert debriefing*. The results were discussed and confronted with the opinions of another researcher who had been previously involved in investigating the preparation phase for Beaufort implementation in Medinet (see Fehse, 2002).

4.8.2 Discussion

After eighteen months of preparation, Beaufort was introduced to its first users–employees of the personnel and salary department, referred to as the PSA. Eight months later the same technology was introduced to a 'group' made up of decentralised users. As we saw, the results of the two implementations went in opposite directions.

In this section, we discuss what actually happened in Medinet during the Beaufort implementation, and how we can portray it from our theoretical perspective.

First of all, the system installation was initiated by the top management, and employees simply had to start working with it. In both settings, use of the technology was mandatory. In the conventional terminology, Beaufort would be labelled as a representative of ERP systems. Its main role in Medinet was to support the decentralisation of the personnel services across the entire organisation (and to replace an outdated existing IT).

What did the PSA users feel when Beaufort was first introduced? Firstly, there were no changes in their job tasks and although, at the beginning, Beaufort was not very easy to work with the employees were ready to invest efforts in discovering the system. This was because they were convinced of its potential for their work, and the users' feelings about Beaufort's relevance for their job grew daily. The system helped in executing their everyday tasks, and it matched the way people used to work and the reciprocal interdependence lines in the department.

What did the decentralised users feel with the introduction of Beaufort? Firstly, the system brought changes to their tasks: a much greater and unpredicted responsibility for what had been only secondary tasks, new content in these tasks, and the need to become highly interdependent with other users whom they hardly knew before. The stress and increased responsibility brought by Beaufort initiated a fairly negative mindset amongst the decentralised users. They did not want to accept a 'sudden increase in importance' in the boring, routine tasks.

From the very beginning, the two groups of users had opposite frames of mind concerning Beaufort implementation and its relevance for their tasks.

What were the respective backgrounds of the groups as they prepared for the technology introduction? The PSA group already had strong team characteristics including a well-working task division and group thinking; it had 17 members all at one location in Medinet. The group of decentralised users did not have a clear picture of their new division of tasks that were to be performed with Beaufort. Probably their associated task interdependence would have to be built up during the Beaufort implementation phase. The decentralised group was expected to number about 65-80 users, distributed across 64 units of the company. Thus, the PSA department had a long history of working together, and the decentralised users had never worked together as a group before the system was introduced. Therefore, although the PSA members knew each other very well; among the decentralised users there was little or no knowledge of each other's strengths, backgrounds, and interests.

This case study has shown that advanced software skills could not always be associated with the implementation success. Thus, we saw that the computer literacy of the PSA users was fairly uniform and at a moderate level. On the other hand, the software experience among the decentralised users varied from insufficient to excellent. However, it was especially the users with excellent computer skills who disliked Beaufort the most.

We also observed differences in user participation in the project. There was no agreement about the installation of the system from the PSA members but full support

from the decentralised users; and there was no participation during the preparation phase by the PSA group whereas some of the decentralised users were members of the steering group of the Beaufort project. We did not find strong relationships between user participation and their satisfaction with the technology.

We saw that, after the system went live, the meaning assigned to it by the two groups of users continued to develop. The PSA employees helped each other to improve their understanding of Beaufort, and even converted small doubts about the system into seeing its benefits over its limitations. The decentralised users, on the other hand, hardened their negative impression of the same technology. Some users did not even try to work with Beaufort after stories they had heard from those who had. As a result, this group used its solidarity to develop a pessimistic shared opinion of Beaufort. They came to the conclusion that there was no future for Beaufort in Medinet.

To assess how the interaction processes helped the developments move in different directions, we have given qualitative labels ranging from 'weak' to 'strong' (i.e. active-passive, high-low, intensive-fuzzy) to the group learning dimensions. With such labels we keep to our operationalisation scheme, where 'high' learning reflects an intensity in the users' activities and orientation towards improvement in system adoption (see matrix below). We have categorised the overall group learning in the PSA department as relatively strong towards the adoption of Beaufort. For the group of decentralised users, overall group learning towards the adoption of Beaufort was labelled as weak:

	Group learning in PSA	Group learning among decentralised users
Collective acting	Moderately active	Passive
Group reflecting	Moderately strong	Mostly weak
Knowledge disseminating	Moderately intensive	Low
Sharing understanding	Moderate	Low
Mutual adjustment	Moderate	Weak

We deduce therefore that the PSA users developed the 'first part' of the learning wheel more strongly than the second part: all the dimensions in the constructs 'acting–reflecting–knowledge disseminating' were moderately high, whereas 'sharing understanding–mutual adjustment' were only moderate. The users in the PSA department were more active in discussing difficulties in IT implementation and helping each other than in proposing new activities, developing agreements, or evaluating results. The PSA employees started operating with the system actively, every day, once the system was introduced. They discussed their difficulties in working with Beaufort, helped each other, and clarified the technological options; they became used to bringing individual difficulties in working with Beaufort to the discussions. However, they acknowledged that at the beginning they did not need Beaufort and had very vague ideas about the goal of the system in Medinet. Although the users sometimes had good ideas about possible improvements, the application of such ideas usually took too much effort. It was easy for the group to develop internal rules and regulations and start evaluation discussions, but regulations regarding

interdepartmental use of Beaufort (with the pilot departments) were difficult to achieve.

The PSA employees characterised the system as 'not difficult' after the transition period. They expressed the view that they could operate the basic modules quite easily and quickly. Only one of the optional modules ("Informer") still required additional effort to run. They also considered that the further exploitation of Beaufort would not pose difficulties. They articulated opinions that the system was very helpful and advanced in supporting their tasks. In particular, they rated highly the aspect that all the personnel information could be seen on a single screen. They believed that they could perform the documentation and administration procedures faster than with the previous system. Also, they appreciated that the system helped them when communicating with their clients: during telephone calls it was sufficient to use only one screen avoiding difficult paper-based searching processes.

We have also observed that the group learning processes in the PSA group improved over time: the employees started to operate the "Informer" module more actively; their suggestions to improve the implementation process acquired a proactive character in that they initiated discussions about the future state of Beaufort in the entire Medinet; and their attitudes towards Beaufort functionality also improved.

The findings concerning Beaufort implementation in the group of decentralised users show that all five learning processes were at a low level: the users hardly operated with Beaufort, they did not discuss how to improve the use of the system, they were not active in helping each other to work with the technology, or to understand it better, and they all shared negative opinions about Beaufort and its functionalities. Although they understood the ideas and the role of the system in Medinet, none of them needed it for their own job tasks. They became very active in convincing the project team and each other of the useless functionality of Beaufort and, finally, they stimulated the termination of the pilot trials.

The decentralised users were not very enthusiastic about using the interface–it seemed not to be very user-friendly and involved a lot of screens and steps. Three decentralised users who were used to working with their own computerised HR system did not find Beaufort technically difficult. They could operate the modules quite easily and quickly (under the supervision of the project team). The remaining end-users in this group were convinced that filling in paper forms was much easier than using Beaufort. They felt uncomfortable working with the system, and were even 'afraid' of clicking the buttons without supervision and help. They considered the interface too complex, with many unnecessary items. These items (on the tool bar or the menu) brought additional confusion. In order to make one particular input in the SLA module they had to open five screens. The decentralised users were of the opinion that the system did not facilitate their existing tasks, but rather added new ones. They acknowledged the importance of Beaufort for salary administration, but did not find it essential that they participated in it. They stressed that time registration and SLA were minor administrative responsibilities among all their HR work, but that the system forced them to pay too much attention to such tasks.

Managerial support for the users in the Beaufort implementation differed in the two settings. The PSA employees were led by the project managers through most of the

steps involved in learning the system. The project team, together with the head of the PSA department, planned and scheduled all the educational, experimental, and implementation activities. There were many learning opportunities arranged for the PSA employees, including software courses at Getronics and a special didactical course, the general manual from Getronics, a minor manual adapted to the PSA 'environment', and regular information bulletins that provided task assistance. Online chat was intended to exchange experiences and ideas. Prior to the introduction of Beaufort, the end-users were allowed two hours a day for one month to practise with the system. Any mistakes made by the users were immediately discussed during meetings.

The decentralised users experienced another managerial support tactic: the project team strongly recommended them to strictly follow the instructions they received. They were not allowed to make any inputs without them being double-checked by the PSA department and the project team. Experiments with Beaufort were forbidden because they could result in financial chaos. Only one decentralised user attended the Beaufort course at Getronics, and she was then expected to teach the others how to operate the system. For the other decentralised users, the major source of information about Beaufort was a one-hour instruction session provided by one of the PSA specialists. The reading materials available included the general Beaufort manual provided by Getronics and a 'sub-manual' from the PSA department. Specified time was not set aside for practising with Beaufort. Daily tasks remained unchanged. The employees sensed a serious lack of being "rewarded for their efforts". Comments on their use of, or learning, the system from the project team took place only in the event of negative emergencies. Employees were neither rewarded nor recognised for their efforts in learning the new system. A rewards scheme did not exist.

Having discussed our observations in the Beaufort case, we should now reflect on the research model. This will help, we believe, to crystallise our conclusions from this case study.

4.8.3 Analysis of the constructs in the research model

The next challenge is to sharpen the content of the research model dimensions, i.e. to analyse the relevance of the components. In this section, we review the relevancy of the components for the constructs of group learning, managerial support, and stable use. We will first, very briefly, recall how this analysis is to be performed (it was elaborated in the Methodology chapter in some detail), and then present the results for each dimension.

To estimate the significance of the components (in the group learning, managerial support, and stable use constructs) we have combined two perspectives: firstly, the research value of the sets of texts (discourses) from the interview transcripts, ranked from "low–high"; and, secondly, the linguistic and contextual features of those text units, which can sometimes bring additional connotations to the components.

We have viewed every component from four angles:

- The total number of analysed text units that represent the component.

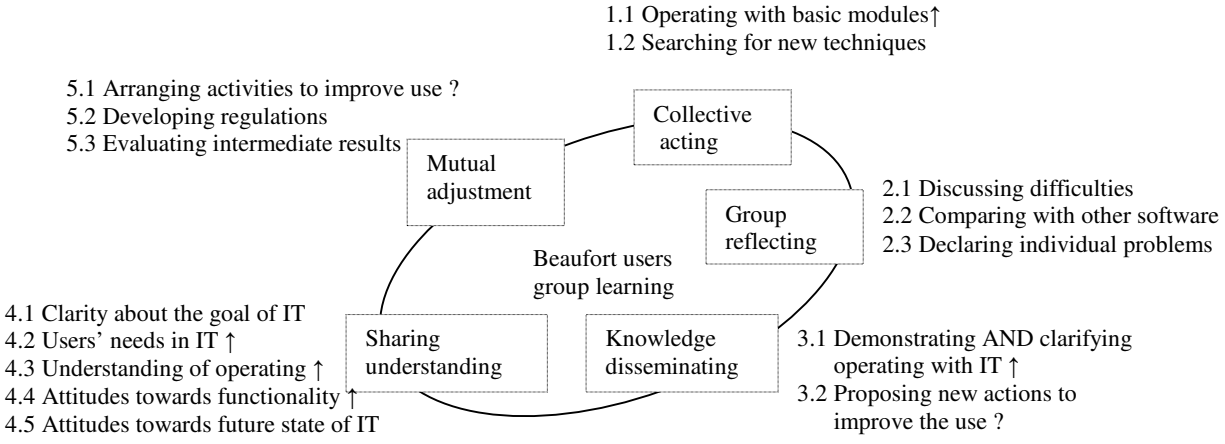
- The qualitative labels, or ranks, which were applied in the descriptive part of the case study: strong, moderately strong, moderate, mostly weak, weak.
- The linguistic features of each text unit for their significance for the component.
- Where applicable–the historical and contextual characteristics that contributed to the evaluation of the component and the dimension as a whole.

Through such a sophisticated analysis, one should be able to refine the components in the research model. Further, we observed that:

- The analysis supports the strong relevancy and correctness of some of the components in the group learning, managerial support, and stable use constructs; and these are retained unchanged in the models;
- Some pairs of components could be combined into one new component;
- There were also components that did not find support (text units seemed to be vague, not clear, mixed up with other ideas, or interviewees attempted to avoid that topic during the conversation).
- In the group learning construct, we saw that some components had a potential to develop further: they were not fixed for all time. For example, in the case of the PSA users, we observed progress in the 'sharing understanding' process, especially in understanding the IT functionality and attitudes towards the system.

Below, we provide the results of analysing the three constructs: group learning, managerial support for Beaufort implementation, and its stable use.

Figure 4.2 represents the findings from the discourse analysis on the *group learning* dimensions and components. In total, 107 text units were analysed.



"?"–a component had no support in this case study but is retained until the cross-case analysis
↑–the observable rend within a component
AND–two components were combined following the analysis

Figure 4.2. Refined Group Learning components in the Beaufort implementation

As can be seen in Figure 4.2, two components out of the 15–proposing new actions to improve system use and arranging activities to improve system use–found little

empirical support and were not convincing. Therefore, we marked them as "questionable" but retained them until the cross-case analysis to see if support was to be found in the later case studies. Two other components–demonstrating how to operate the system and clarifying difficulties in working with the system–got support but it seemed difficult to differentiate one from the other. We therefore decided to combine them as one, again to be reconsidered in the cross-case analysis.

In the PSA sub-case, we observed positive developments over time in five of the components of group learning:

- operating with basic modules,
- demonstrating and clarifying how to operate the system to other members of the group,
- users' needs in Beaufort,
- understanding of operating, and
- attitudes towards Beaufort functionality.

The rest of the components stayed unchanged, as in our original operationalisation.

In the 67 text units referring to the construct of *managerial support* we found four "questionable" components: freedom in use of Beaufort, consultations and informal learning, time to discuss the system, and managers' time allocated for end-users (Table 4.4). Four components were further combined into two pairs: responsibility of the end-users for decision-making with authority in planning their work with Beaufort; and recognition of progress in working with the system was combined with rewards. The other components remained unchanged.

Autonomy and responsibility	responsibility of the end-users in decision-making AND authority in planning work with the system freedom in use of IT ?
Promoting learning opportunities	formal training sessions availability of material resources consultations and informal learning ?
Feedback	recognition of progress in use of the system AND rewards
Management style	willingness of managers to help and cooperate with end-users consideration of users' ideas
Time	having time to practise having time to discuss the technology? managers' time allocated for end-users to discuss implementation issues?

"?"–a component had no support in this case study but is retained until the cross-case analysis
AND–two components were combined following the analysis

Table 4.4. Refined components of Managerial Support in the Beaufort implementation

The analysis of 42 text units of the *stable use* construct revealed two "questionable" components: speed of operating with Beaufort, and perceived quality and availability of information (Table 4.5). The other components remained unchanged.

Ease-of-use	perceived speed of operating with the technology? no difficulty in operating with the system friendliness of the interface
Task-system fit	perceived importance of the system for the tasks perceived quality and availability of the data for the group members ? perceived match of the system with the ways of working in a group

"?"–the component had no support in this case study but is retained for the cross-case analysis

Table 4.5. Refined components of Stable Use in the Beaufort implementation

Having concluded the analysis, we can say that the Medinet case study has contributed to the further building of the research model. In total, the relevance of eight components has been thrown into doubt: four components from the managerial support construct, two components from the group learning construct, and two components from the stable use construct. However, we will postpone final judgment until after the cross-case analysis.

4.8.4 Conclusions and refining the research model

The first case study was conducted in a large Dutch hospital, here given the alias Medinet. The Beaufort personnel management system was introduced in two settings: the personnel and salary department (PSA), and to the managers of distributed medical and other departments. The implementation of the same system in the two settings proceeded in very different directions and resulted in opposite results. After having discussed the general observations and analysed the constructs in the research model, it is time to combine all our findings in one view.

The differences between the two sub-cases lead us to the idea that the usefulness of the system provides the initial direction to group think: the PSA users appreciated the support provided by Beaufort while the decentralised users disliked it from their first attempts to work with it. The complexity of the interface contributed to the growth in negative attitudes and misunderstandings in the decentralised sub-case.

Beaufort did not bring any task changes to the work of the PSA specialists. The system supported the required *reciprocal* task interdependence which fully matched their previous work situation as a group. However, the decentralised users had to significantly change their work processes. They had to learn new secondary tasks, and to assume more responsibility in performing those tasks. The system brought/offered/required *associated* task interdependence in the group whereas the existing task interdependence was only *pooled*. The decentralised users faced a new, very complex collaboration situation.

The Medinet case study showed, convincingly, that the tasks related to personnel information–administering and managing–were very sensitive. They were associated with the privacy and the security of very sensitive information, and therefore required clear responsibilities.

In the two different groups of users, two characteristics seemed to be important: task interdependence and prior experience of working as a team. The unclear task division complicated Beaufort implementation in the decentralised group, and the absence of mutual trust did not allow them to develop it in a positive direction.

The perspective of group learning provides us with some interesting ideas about the different outcomes in the two sub-cases. We saw that group learning includes interaction processes through which group members develop their group understanding about the system, and give it a meaning as relevant or not for their tasks. The users made use of the system, discussed this experience, experimented, and searched for new possibilities; they communicated about this, asked for help, clarified difficulties, and talked about errors while working with it; they proposed new actions to improve its use, planned further implementation, developed common rules on working with the system, and evaluated its use at different stages. As a result of these actions, the technology was perceived as helpful by the PSA group and, on the contrary, as obstructive by the decentralised users. That led to a rapid acceptance of Beaufort by the PSA group, and strong resistance by the decentralised group.

We found that the five group learning steps we had included in our operationalisation scheme–collective acting, group reflecting, knowledge disseminating, sharing understanding, and mutual adjustment did exist in reality, and these processes were found in both settings. An important finding was that group learning emerged immediately after the new technology was introduced to the users in both settings.

Although group learning processes did take place in both cases, their content was different. In the PSA department, these processes helped to improve the adoption of the new system and led to its stable use. In the group of decentralised users, the learning processes blocked adoption of the new system and contributed to the termination of the whole project. From this, we deduce that group learning can take opposite directions–it can either speed up implementation, or slow it down.

We have observed that the collective acting and sharing understanding dimensions progressed the most during the learning cycle. Specifically, five components primarily evolved during the Beaufort implementation:

- operating with the basic modules in everyday task performance
- demonstrating how to work with the system and clarifying difficulties to other group members
- users' needs in the system
- understanding of operating with Beaufort, and
- attitudes towards the functionality of the technology.

We thus can assume that these processes can be flexible and dynamic and, therefore, we would suggest that those who are responsible for the implementation of a new system should pay particular attention to them. We also noticed that these processes took less effort to improve than did group reflecting and mutual adjustment. Progress

was achieved by structural arrangements such as task reassignment and offering learning possibilities.

Group learning processes stimulated the groups' opinions about Beaufort. Thus, the PSA department developed their 'wisdom' towards accepting the system, and seeing it as a useful media for their tasks. They believed that Beaufort improved the speed of document administration, the service of the department to their clients in Medinet, and they thought it was not difficult to operate. The decentralised users developed opposing opinions. They considered Beaufort to be unreasonably difficult, they saw it as an additional task that required special competence in personnel administration, and they were convinced that the paper-based transactions were both easier and safer.

While we credit the successes and failures in the Beaufort adoption to differences in group learning, we also acknowledge the importance of the organisational circumstances in such processes. Although the insights that arise from adopting a learning perspective are remarkable, the results need to be considered from a broader perspective.

The idea that managerial support does influence the adoption of the system is hardly new. However, we did observe the importance of such issues as promoting learning opportunities for the users, including evaluation rounds, discussion sessions, and peer teaching.

This case study has shown that managerial support for the users must start before a system is introduced by investigating and clarifying the job relevance of the technology for the end-users. This should include clarification of the goals of the system for the entire organisation, but also in terms of the individual needs of the users. The next step is to define the content and division of tasks to be automated by the technology in advance. We saw that the greater the interdependency between the users demanded by Beaufort, the more the effort that was needed to redirect group learning from a small group to the entire group of decentralised users. We saw two types of task interdependence in the Medinet case–*reciprocal* interdependence in the PSA group and the more complex, *associated* type of interdependence with the decentralised users. The mismatch between the task interdependence required by the system, and the one that previously existed in the group of decentralised users, significantly increased the complexity of implementation.

In summarising the conclusions from this case study, we would emphasise that we observed the following:

- that the initial direction the group processes took was influenced by: the usefulness of technology for the job tasks; the clarity of those tasks; and the interdependence of the tasks to be automated;
- that group interaction processes emerged as soon as a system was introduced to the networked users;
- that group learning could change direction after a system was introduced: it could develop in favour of or against the adoption of a system;
- in the positive sub-case we observed progress in the group learning processes, and this supports the ideas on flexibility in group learning;
- that the most visible progress was in the collective acting and sharing understanding components, i.e. in knowledge acquisition processes;

- that the indicators of evolving collective acting and sharing understanding were: increasing operations with the basic modules, actively demonstrating how to work with IT and clarifying difficulties to other group members, a growing recognition of the users' needs in the system, progress in understanding operating with Beaufort, and improving attitudes towards the functionality of the technology;
- that there was not much influence of previous software experience and user participation on the results of the implementation;
- that while technology can bring new and complex task interdependencies, and might demand new collaborations among employees, this needs to be operationalised and clarified in advance in order to match the offered with the existing task interdependencies;
- that project leaders did provide useful support by promoting learning opportunities for the users in the PSA department, but they failed to operationalise the tasks and clarify the needs in the system for the decentralised users. In our view, this should have been done before Beaufort was introduced.

To make use of our findings from the Medinet case study we have refined the preliminary research model for IT implementation, based upon the findings from the PSA sub-case in the Beaufort study, resulting in the model shown in Figure 4.3.

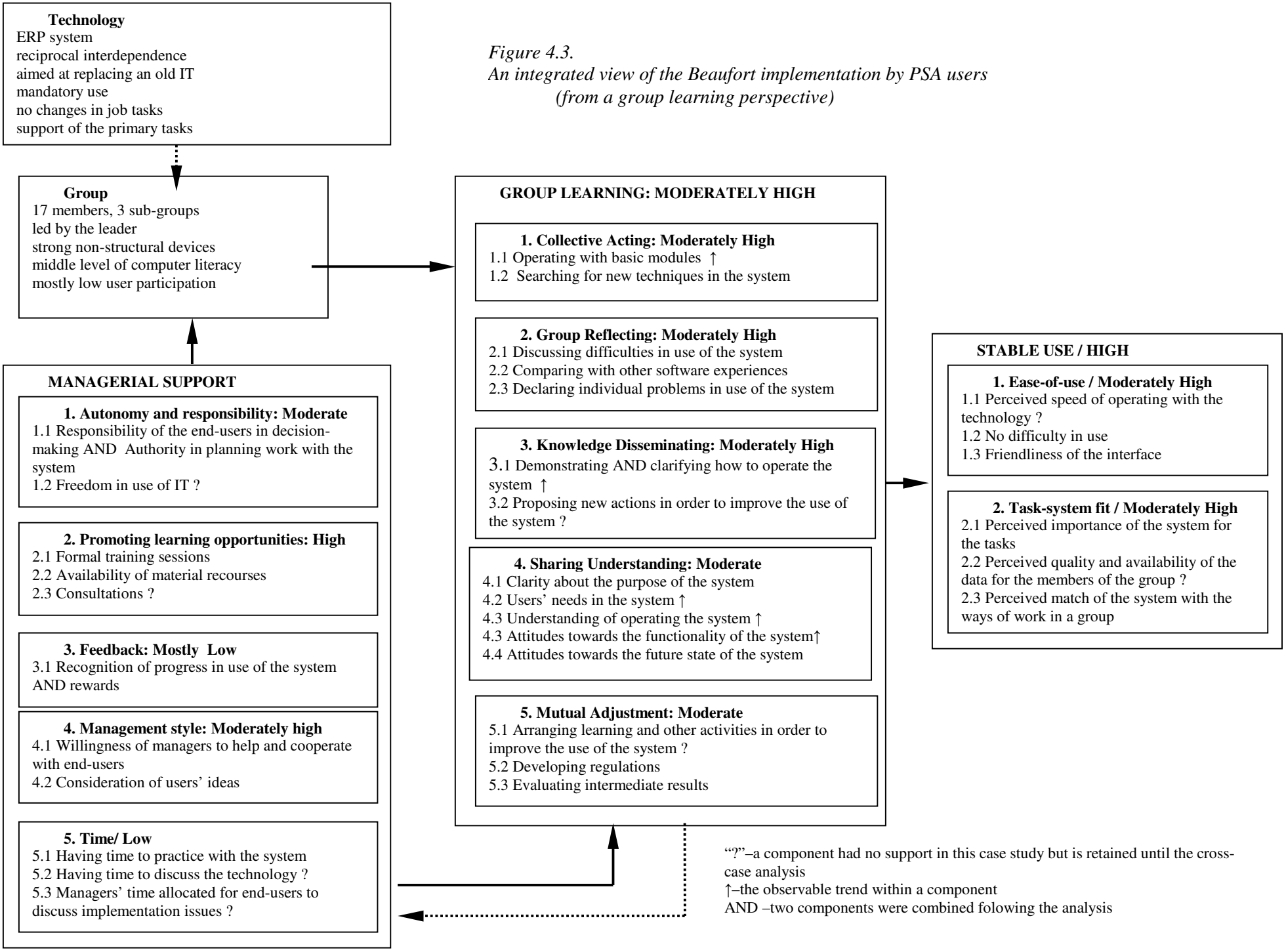


Figure 4.3.
An integrated view of the Beaufort implementation by PSA users (from a group learning perspective)

5. INSURORG CASE STUDY – IMPLEMENTATION OF THE KENNISNET SYSTEM

"The KennisNet system was designed fine… in accordance with its budget."

From the interview with a product manager in InsurOrg

Our second case study was conducted in a large insurance company "InsurOrg". After a fusion of several formerly autonomous companies, a knowledge management strategy became one of the policies for achieving a common InsurOrg competence. A range of practices were implemented to achieve that policy–including digital knowledge networks.

Our case study reports on the implementation process of the knowledge management system–KennisNet–in the non-life (or *schade*) segment of InsurOrg. The introduction of the system was initiated by the Knowledge Centre Schade (KCS) with the objective of becoming a virtual Knowledge Network for the non-life insurance professionals working at five different locations, referred to in the remainder of this chapter as sub-companies. These professionals were responsible for the development and business analysis of the new non-life insurance products. Aiming to develop integrated products, they were compelled to work together as a group two years before the system's introduction. They received the idea of introducing KennisNet with enthusiasm because they felt a need to support the exchange of their knowledge and expertise. The users' participation in the design and development of KennisNet seemed to fill an important role in the project.

After discussions and preparation, the new system was introduced to the group in October 2001. It gave the impression of being an easy and useful system but, right from the beginning, usage of KennisNet was very low.

5.1 INTRODUCTION

We started this case study by being forewarned by the project leaders about the lack of usage of KennisNet. Despite the interest and need of such a system at the beginning, the targeted employees did not work with it, and the project appeared to be almost beyond hope.

This point of departure made our first and second case studies essentially different. Now we had to go one step further and explain why the system was not used as expected, instead of just observing and evaluating its adoption from the group learning perspective.

The InsurOrg case study was aimed at further refining our initial understanding of IT implementation through group learning. We wanted to develop our findings from the

previous case by investigating the dynamics of the group learning characteristics. The goal of this case study remained threefold:

- to exemplify the theoretical discussions about the implementation of IT through group learning,
- to clarify the contents of the constructs of group learning based on the experiences of the KennisNet users, managerial support and stable use of KennisNet, and
- to refine the research model on the basis of the KennisNet implementation.

We formulated specific research questions for this case study:

- In what way did group learning develop in the non-life insurance group over time?
- How did this influence the implementation of KennisNet?
- What was the role of group learning (and its particular five steps) in KennisNet's failure?
- Which of the group learning processes withdrew adoption of KennisNet and when did it happen?

Continuing to build on our understanding of implementation as a group learning process, we used the same case study protocol. After describing the research methods applied in this case study, we describe the KennisNet implementation in the following order. First, we present the organisational context of InsurOrg, the background to the KennisNet project and the historical account of its implementation (Section 5.2). Following our research model, we describe the contextual constructs and discuss the characteristics of the group of KennisNet users (Section 5.3). Then we present the technological features of KennisNet–its modules and the ways in which employees were supposed to use it. We will show that the system, built on top of Lotus Notes, was not very difficult to use but had some annoying drawbacks (Section 5.4). Next we discuss the implementation of KennisNet through group learning (Section 5.5). Managerial support for the implementation is presented in Section 5.6. The results of the project are described in Section 5.7. All findings are supported by quotes from transcripts of the interviews with the participants in our research.

To draw conclusions from the case study we will analyse and refine the research model in a similar way to our first case study. To do this, we will discuss the content of the constructs-dimensions-components in the model on the basis of discourse analysis. We will then finalise the case report with the 'mapping' of the research model (Section 5.8).

5.1.1 Methods

The case study took six months to complete. Data collection involved qualitative methods: semi-structured interviews, observations, and document analysis.

The interviewees represented two parties, the project management and end-users:

- We have referred to as project management team members: the four members of the Knowledge Centre Scade (KCS) (the manager, the project leader, and two employees of the Centre) who played a double role in being end-users of the system and carrying out managerial tasks for the group as a whole; plus

the person responsible for the technical design of the system; and the researcher involved in building the concept of knowledge management in the company (Dignum, 2004).

- The end-users were non-life insurance specialists from the five sub-companies (A, B, C, D, E) who were supposed to be active users of the system. We interviewed 19 employees who were available and willing to participate in the research.

We interviewed 25 out of the 39 people involved in the project's realisation (64%). Each interview lasted between one and two hours, in total 31 hours. Table 5.1 shows the type and number of interviews conducted at InsurOrg.

Job position		Number of interviews per sub-company					Total
		A	B	C	D	E	
Members of the KennisNet project management		-	-	-	-	-	6
End-users	Product Managers	3	3	2	3	1	12
	Actuary Specialists	1	2	1	2	1	7
Total		4	5	3	5	2	25

Table 5.1. Type and number of interviews conducted at InsurOrg

The interview questions were the same for all interviewees (see Appendix 2). During conversations with members of the KCS, we also asked about the organisational changes and strategic plans of the Centre. The non-life insurance professionals were asked about the group learning processes, institutional use of the KennisNet system, and organisational support for its implementation. The designer became the main knowledge source on the technical characteristics of the system.

Transcripts of all interviews were checked and corrected by the interviewees.

Additional information on the state-of-the-art of the KennisNet implementation was obtained during informal conversations and through participating in the team-building activities. We participated in two non-life workshops where we had the opportunity to become familiar with the group.

We studied documents relevant to the research theme: the 2001Annual Report of InsurOrg and Special Issue to the Report, the KennisNet Manual, the Business Plan of the KennisNet project, and the project plan.

5.2 THE ORGANISATIONAL CONTEXT

InsurOrg is one of the largest insurance companies in the Netherlands, with a turnover of €6.7 billion and 12.500 full-time employees (Annual Report 2001). InsurOrg is the

result of twelve years of mergers between previously autonomous insurance companies. It has united about 30 formerly independent insurance organisations.

The organisational structure was to be based on several divisions according to the professional specialisations of the sub-companies[3]. It has led to the creation of eight Business Units (BUs): Medical Care, Pensions, Social Security, Private Lines Insurance, Commercial Insurance, Intermediary Insurance, Banking, and Corporate Accounts.

The Business Units, in their turn, covered several segments based on the types of insurance activities, for example Life insurance, Non-life insurance, Health insurance, and Banking. Most Business Units offered insurance products to the market under more than one brand name. The focus of our case study was the IT project in the non-life insurance segment. Insurance segments were restructured further. Thus, within the non-life insurance segment, they were expected to organise special product sub-units such as for car insurance and for caravan insurance.

The organisational structure was complex; but reflected the main InsurOrg strategy–to unify all the sub-companies but keep their business images and brand names, and therefore their uniqueness, alive. All the sub-companies operated under their original business labels, but there were many joint projects aiming to reinforce the merger processes. The merger processes faced difficulties caused by differences in the sub-companies' traditions, cultures, management and business development.

In order to benefit from the expertise of the units, InsurOrg developed a strategy towards cooperation between them, bringing all employees together, and creating a new, corporate organisational culture.

That was the main force behind starting a knowledge management strategy as one of the approaches to achieve new organisational development. With the support of the knowledge management strategy, InsurOrg expected to achieve:

- core competence development across all sub-companies;
- team building and group identity across professionals;
- and internalisation processes.

Several projects relating to the systematic development of the knowledge management strategy were running in InsurOrg at the holding company and local levels.

This case study describes one of those projects: the introduction of the digital knowledge network–KennisNet–to the non-life insurance segment in InsurOrg.

5.2.1 Background of the KennisNet project

Six knowledge/competence centres in InsurOrg were involved in implementing the knowledge management (KM) strategy. One of these was KCS, which became an early adopter of the KM strategy in the field of non-life insurance. KCS had been organised about four years earlier as a consultancy department located in one of the sub-companies. Initially, it was responsible for giving advice concerning business and

[3] Due August 2002

product development. Gradually, KCS got a broader mission and became the centre of the non-life insurance community in InsurOrg, including specialists from five sub-companies.

KCS had multiple functions during the case study period. We summarised these as:
- developing an integrated non-life insurance competence in InsurOrg;
- leading different projects within the non-life insurance group;
- building a close community of non-life insurance specialists, people who had earlier worked for their own sub-companies.

To develop non-life insurance competence, the KCS started a Knowledge Network project that aimed at structuring, initiating, and organising the sharing of knowledge within the group (Project Plan, April 2001). The project consisted of two parts:
- developing a tradition of regular face-to-face meetings
- introducing an efficient Knowledge Net system.

There was also an external challenge at the start of the project. In order to develop the best technical support for knowledge management in InsurOrg, the Management Team initiated around four experiments with different ICTs in various communities. At that time, the non-life insurance group was one of the first stable communities to have specific requirements for ICT. The Knowledge Centre agreed to start the KennisNet project, and had the freedom to design and develop a knowledge system that was "as nice as they wanted". It became a sort of pilot to test the possibilities of Knowledge Management ICT in InsurOrg.

From this background–supporting the sharing of knowledge among the non-life insurance specialists and piloting a knowledge ICT–the new KennisNet system was introduced in October 2001. The project did not get a budget: it was an initiative by the KCS.

5.2.2 History of the KennisNet introduction in InsurOrg

The first version of KennisNet was designed and introduced to the users in 1998. It had the role of being a first attempt to bring the targeted employees together. Being the first try, it had some limitations. It served only as a database system, without providing support for discussions. Employees worked with this version mainly as 'seekers' and 'readers' of information. Another limitation was related to the ontological classification. Information was not categorised in accordance with the expertise of the employees (Dignum, 2004).

In 2001, when the non-life insurance group was reformed into its current status, it became obvious that there was a need for a more advanced system. In April 2001, a first draft of the project plan was ready. In May 2001, the project proposal was approved by the non-life insurance specialists during a workshop.

The period June–August 2001 was the most promising in terms of the future of the KennisNet system. There were many discussions about the design of the system, and all members of the group participated in requirements analysis and the functional design of KennisNet.

In September 2001, future users discussed the design of the system during a second workshop. In October 2001, KennisNet was introduced to all members of the group. It took one week for the whole group to get familiar with the specifications of the system. However, from November 2001 on, the employees did not use the system as much as had been expected.

5.3 CHARACTERISTICS OF THE TARGETED EMPLOYEES

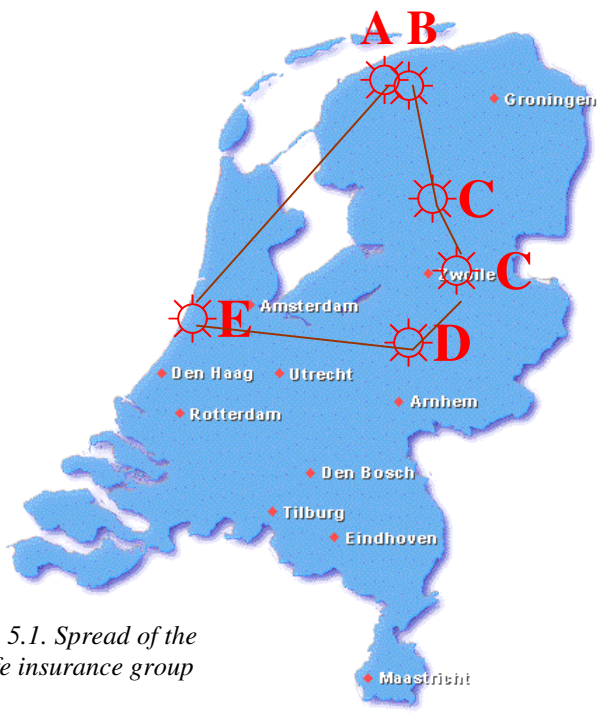


Figure 5.1. Spread of the non-life insurance group

In this section, we present the targeted employees: professionals in non-life insurance who were to become the core users of KennisNet.

In our theoretical framework, the group characteristics might be important for the group interaction processes. For this reason, we should first look at what kind of group was supposed to use KennisNet: its structural and non-structural devices, including task design and interdependence, group composition, group norms and traditions, and also software experience.

5.3.1 The structure of the group of KennisNet users

The non-life insurance circle consisted of 39 employees, including the Knowledge Centre and the non-life insurance workers: 38% were female, 62% male; the average age was 36.2; the average time working for the company was 10.5 years; 74% of the employees had been educated at the university level, 15% had attained higher vocational education, and the remaining 11% had left after high school.

The core of this group consisted of two types of insurance professionals: product managers and actuary specialists. They were distributed geographically across five locations (Figure 5.1).

The group had two years of joint experience. Previously, the employees had worked for their independent insurance companies and were competitors. Sharing knowledge

with former competitors might well have been seen by many of them as a strange initiative.

As members of the group, all the product specialists had two bosses: the manager of the Knowledge Centre and their direct supervisor. The manager of the KCS was the informal leader who considered himself responsible for community building; but he was not in charge of the task performance of the non-life insurance specialists.

All of the employees were members of the Knowledge Circle as a professional community, but they all were employees of different departments. Actuary specialists worked in the Financial and Actuarial departments. Product managers worked in the Knowledge non-life Team (sub-company [D]), or the Operations Department ([A]), or the Quality Bureau ([B]), or the non-life Service Unit ([C]), or in the Department of Planning and Control ([E]). The managers of those departments were the direct supervisors of the product professionals, and received reports from them on work results.

The employees perceived being assigned to the non-life insurance group as the 'given situation'. The group was not a group limited by the boundaries of one department as they were from a range of work units; it was not a community of practice as participating in the group was not voluntary; it was not a project group as there were no clearly defined projects. From the time prospective, the period of the groups' existence was also unclear due to unpredictable organisational restructuring. We can refer to the group as a virtual team.

5.3.2 Non-structural devices of the group of KennisNet users

The Knowledge Centre invested a lot of effort in overcoming the competitive climate in the group. They supported information exchange between the employees. They formed an active sub-group of contact persons–representatives from every sub-company. Five employees, therefore, became the core of the whole group for discussing and promoting different projects and for communicating across the group. Another initiative of KCS was a regular face-to-face workshop for all members which took place once every three months. These were dedicated to different topics such as statistical reports, new product development, Euro-projects, premium increases.

We participated in two such workshops and, both times, we gained two impressions. On the one hand, the workshops followed a typical top-down, instructive approach. The aims were to exchange actual information, but the points for exchange were selected by the KCS leaders, and not by the members of the group. The employees played, in our view, a passive role during the workshops. The programmes for both meetings included well-prepared reports and presentations. Participants were welcome to ask questions, but nobody took an initiative to start a discussion or raise another topic. It seemed as if there was no space for free and informal discussion, or even for 'non-relevant' issues. The KCS leader led the workshop. However, we should acknowledge that, on the other hand, following the official part of the meeting that the employees did take advantage of the opportunity to talk with each other. During the interviews, everybody referred to the workshops as very nice events.

According to the KCS, the group has changed a lot since the beginning. The employees have gradually came up with ideas to share some information, discuss common problems, and invite each other for professional debates. As the project leader noted, "everybody has been convinced to work collaboratively".

Informal communication was active within the group. While we were doing our research, a large discussion took place among different specialists about raising insurance premiums. Sub-companies were expected to use different coefficients to increase the premiums, and the employees discussed it together. In another area, the sub-companies learnt from each other about developing risk-based rather than cost-based insurance products and creating adequate databases. For example, sub-company [A] taught others about car insurance, and [D] provided additional information on home insurance.

In addition, we observed that new products were discussed across the whole group. Thus, the specialists in travel insurance themselves initiated a meeting to discuss a newly developed product from sub-company [C]. The 'caravan' specialists were busy working together on the 'non-life project'.

Such collaborations were informal, non-structured, and based upon the needs of the employees. They phoned each other or sent e-mails when they wanted to acquire information. Nobody expressed any difficulties concerning this way of communication.

All the above described events demonstrate that, before the introduction of KennisNet, the group had already established effective ways of communicating with each other on relevant topics.

5.3.3 Tasks and responsibilities

We will present the tasks of product managers and actuary specialists separately and show that we discovered diversity in the content and logistics of their tasks for each sub-company. This complicated the process of knowledge sharing and integration in the entire group.

Tasks and responsibilities of product managers

Two-thirds of the group were product managers: responsible for the management and development of non-life insurance products. These products can be classified into three groups:

- mobility (e.g., private cars, motorbikes, caravans, trucks, lorries),
- recreation (e.g., boats, yachts, travel),
- home insurance (e.g., valuables, legal services, glass, fire non-life, third party liability).

Usually product managers were qualified for only one of these groups. Within each type there were further subclassifications. The product managers' tasks were related to knowledge management within a certain insurance product. In particularly these included:

- Analysis of the market (latest news and opportunities for development in a competitor's business–their new products and policy terms).
- Analysis of the results (statistical calculations were made by actuary specialists, but the qualitative interpretation of the analysis, and searching for a solution, was the responsibility of the product managers). Such analyses were performed at least once a year.
- Legislative procedures (transferring the legal rules and obligations into the product's policies).
- New product development. For example, in sub-company [D], the package for home insurance had remained almost the same for 12 years. Recently, this sub-company had started a product development project intended to update the product and introduce new insurance coverage such as garden insurance. Another example was that product managers in sub-company [B] developed a new insurance package for very old, collectible cars: "Classical Car Insurance".
- Knowledge monitoring. This task placed product managers in an intermediate position between the sales, marketing, and financial departments, and the Call Centres. We can illustrate this with three examples. First, A sales specialist, in response to a customer call, may request from the product manager information about a special service and its conditions (for example, insurance for animal stables). The product manager would be responsible for the advice given. Second, the cooperation with the marketing department was based on the collective development of advertisements and correspondence with customers. Product managers were responsible for the content of the advertisements. Third, the Call Centres were the most frequent co-operators with the product managers. Thus, during one of our interviews, the manager of yacht insurance in sub-company [D] received a telephone call: a customer's yacht was stopped by the Greek Police in the Adriatic Sea with the request to show the insurance documents written in Greek. The customer had the documents in Dutch with an English translation. The product manager had to find a solution from the Netherlands.

To summarise, the primary tasks of the product managers concerned the development and monitoring of the terms, policies, and changes in non-life insurance products. From this viewpoint, product managers expected the KennisNet system to become a digital document sharing space where they could place helpful just-in-time information for the development and monitoring of non-life insurance products: for example, advice about switching to a new insurance product, guidelines on communicating with clients, calculating coefficients for the premiums, translating policy documents into foreign languages.

However, despite the fact that the tasks of the product managers seemed to be similar, and that their work outcomes resembled each other across sub-companies, we discovered essential differences in task division:

- In sub-company [A] there were two types of product managers: so-called product specialists, who were busy with the legislation and prices, and 'real' product managers, who were busy with product development and customer communication. In sub-company [D] these two were combined into one function.

- In sub-companies [C] and [E], all product managers were responsible for all types of non-life insurance, whereas in sub-companies [A], [B], and [D] there was strict task division based on the type of non-life insurance product (mobility, home, recreation).
- In sub-company [C] there was one product manager, who was assisted by technical specialists (they were also considered to be part of product management).
- In sub-company [A], the product managers were directly involved in customer campaigns (mailing, communicating) while, in others, this task was performed by the marketing departments.

The above-described differences complicated the knowledge sharing process. The first and foremost difference was caused by the various roots of the group members: they were distributed geographically, and were representatives of former sub-companies that brought some limited sense to the group work. Second, the diversity of their tasks was interrelated with the diversity of performance logistics, work rules, and traditions. As a result, the employees faced such questions as with whom to share knowledge, whom to ask for advice, and what information to share.

Tasks and responsibilities of actuary specialists

One-third of the group was actuary specialists, responsible for the statistical analysis of the benefits regarding non-life insurance products for InsurOrg.

Their tasks included:
- Risk analysis;
- Calculations and analysis of premiums;
- Reserves calculations and analysis;
- Re-insurance strategy analysis.

Actuarial investigation of new product premiums took about two to three months. This included exploration of the correlations between independent variables (e.g. location, age of the owner, the brand of the car, the company where the owner works) and dependent variables (e.g. the car insurance premium).

We did not discover differences in labour division between the actuary specialists. They all performed the same tasks in the same manner. Therefore, their needs in the document sharing system were less pressing than those of the product managers. During the interviews, only one respondent mentioned that such a system could be helpful if it contained tips about how to make complex reports rather than just listing the content of such reports. The other actuarial specialists did not express any reasons for needing such a system.

We did not discover a task-related basis for the sharing of knowledge between actuary specialists and product managers. In our view, their tasks were too distinct to be shared although they were all involved with non-life insurance products.

5.3.4 Software experience of the users

As we noted earlier, all the non-life insurance specialists were knowledge workers, used to spending days in front of their PCs. In order to perform their tasks, product managers and actuary specialists needed information that was frequently updated. They used different channels to enrich their knowledge environment, both digital and paper-based:

- Regular information bulletins such as *Knipsel Krant*, *AM Signaal* (digital), and also the Dutch Insurance Magazine were the main sources of the latest news on the insurance market and new legislation.
- InsurOrgNet was an intranet that provided employees with updated information and news in the company. It was built on top of Lotus Notes and included several databases, e-mail applications, and telephone guides.
- In each sub-company there were different internal database systems and electronic insurance handbooks (the repository of the products, terms, and policies). Thus, the product managers and actuaries in sub-company [D] worked with the EVI system that combined functions of the Handbook and the Intranet. It also had a special POLLS ADMINISTRATION system to work with the data on all its clients. Sub-company [A] had two main electronic sources: ROLLS, which contained information about car insurance; and DIAGNOSE which stored data on all the products. In sub-company [B], there were several internal knowledge systems which were used actively including PROJECT INTERNET and "Market Reports". These systems were also data storage for all the documents and information about the products. Sub-company [C] had, in addition, two ICT systems for informal correspondence: "C-table" was a forum for discussing problems and complaints, and *NieuwsNet* where announcements for births, birthdays, and marriages were placed.
- The Internet provided product developers with a lot of information, especially regarding competitors (their plans, new policies, products, and changes).

To summarise, we saw that all the non-life insurance professionals were highly skilled in using digital databases and electronic communication systems. The project KennisNet brought one more knowledge management system to the targeted employees.

5.3.5 Intention of KennisNet for the users

The intention of KennisNet for the users can be described in brief as that the system was supposed to assist collaborative knowledge building in the community of the non-life insurance specialists. The users acquired the possibility of publishing documents, asking questions, proposing discussion items, reacting and reviewing each others' work, and announcing news. The system did not bring changes in task identity, the interdependence, or the responsibilities of the users.

5.3.6 Agreement about KennisNet implementation and employees' participation in the project

The managers were very proud to report to us that the initiative to build KennisNet came from the employees themselves. KCS leaders especially stressed that the product managers wanted to improve the current version of KennisNet and to advance the interactive possibilities in the system. They were very enthusiastic about discussing and proposing different ideas regarding KennisNet.

The users' involvement was very active during almost all stages of system design and development. First, they suggested changes themselves. They participated in the development of the knowledge items in the system. Our investigation showed that the users were given full opportunity to discuss their ideas and wishes. Prototyping the system was rapid as the technical characteristics were familiar and not difficult. After the installation of KennisNet, the users sent remarks to the project leader concerning possible improvements.

To summarise, all the end-users fully agreed and supported the idea of introducing the new KennisNet, and suggested improved collaboration items.

5.3.7 The group of KennisNet users: summary

We found that the targeted group was a virtual team created for developing joint expertise in the field of non-life insurance. It had existed for two years and contained two types of specialists: product managers and actuary professionals. They worked in five sub-companies and had different work traditions, task divisions, and responsibilities. Before the introduction of KennisNet, the employees already had an effective way of communicating with each other. Informal communication was the most established group characteristic, which took place through telephone conversations, e-mails, and face-to-face meetings.

However, we did not discover a task-related basis for sharing expertise between the two types of professionals–product managers and actuary specialists.

The group members came from once competitive insurance companies and had different work traditions, rules, and task identities. Such diversity complicated the processes of team building and knowledge sharing. The group did not have structural arrangements for self-development. We did not find joint projects that needed to be built on task interdependence and required collaboration across the entire group. There was a plan to start such a project about accident insurance but we did not find evidence of its existence. Nobody had written or verbal responsibilities for the group; there were no group rules, no common ways of working, or common traditions.

The employees used many other software programmes to fulfil their tasks, and were highly experienced in using electronic databases and on-line communication. The KennisNet system became an additional digital knowledge management environment. We did not find clearly stated expectations for the system, but some interviewees mentioned that it would be helpful if KennisNet could contain informal documents

rather than bulky reports; for example comments on the discussions, tips on how to convert clients to a new insurance product, effective ways to calculate premiums, and advice on making comparative reports.

The following section presents the characteristics of the system.

5.4 CHARACTERISTICS OF THE TECHNOLOGY

In this section, we will describe the system from the perspective of our theoretical framework. Firstly, we will clarify the intended role of KennisNet (Section 5.4.1), then we specify the technical properties of the system (5.4.2), and finally we look at the ways and types of collaboration offered by KennisNet (5.4.3). We will show that KennisNet was perceived as not difficult, but that it has it had some downsides.

5.4.1 The role of KennisNet in InsurOrg

As we mentioned above, the new knowledge network system was supposed to contribute to knowledge management and community building among non-life insurance professionals–in line with the basic InsurOrg organisational strategy.

The documents analysis has shown that there was no clear direction to the KennisNet project. Importance was given to "organising, facilitating, and stimulating exchange of information and knowledge among different non-life groups" in the 2001 Business Plan. However, we did not find answers to several questions: what kind of knowledge should be shared and why? Did all the targeted employees have the same interests in the system or did they have specific and different needs, and if so what were they? What types of cooperative projects were supposed to be facilitated by KennisNet? What tasks required the exchange of information and knowledge? What kind of information was to be exchanged and between whom?

We did not find congruency in the statements about the role of the KennisNet system among the members of the KCS. All of them named knowledge management but only in broad terms, without details applicable to the non-life insurance group.

The categorisation of the documents analysis and interview transcripts led us to the conclusion that the goals of the KennisNet system were threefold:

- A short-term goal was to provide technical support for creating, gathering, and disseminating professional information. KennisNet was supposed to become the 'spot' where the information could be recorded, collected, structured, ordered, stored, retrieved, and exchanged.
- A long-term goal was to develop common knowledge, as compared to shared information. The system aimed to contribute to the unifying of expertise within the group. Earlier, knowledge problems had occurred every time when there was a need to share information across the five sub-companies. Existing information was distributed without there being a general awareness of it. Information gathering activities were often duplicated at the five locations. Employees were not familiar with each other's expertise and experience (Dignum, 2004).

– The ultimate goal was to support "community building" through the development of common knowledge. Becoming a single non-life insurance team across the five sub-companies seemed to be the most important issue.

5.4.2 Specification of the system

KennisNet is an integrated knowledge management system designed on top of Lotus Notes–the existing intranet facility in InsurOrg. The system consisted of two parts: a portal and a knowledge bank.

The portal was the start-up page of the system and it served as the navigation interface for searching in the database. It had links to three rubrics: "information", "general information", and "external information". The three were further sub-structured.

The knowledge bank was a separate application that was accessible through an "actual information" item on the portal. It had links to two main types of data: insurance "themes" and insurance "subjects". These two were modified to suit the InsurOrg audience and working language (Table 5.2).

KennisNet rubrics		Specification
PORTAL	Information - news - questions - discussions	Submitting new knowledge items in the repository 'news', using the special template. Publishing requests for collaboration in the rubric 'questions', with the aim of finding an expert who can provide information. Starting a 'discussion' by submitting a question, proposal, or comments on existing information; and supporting discussion by posting answers and comments.
	General information - knowledge bank - employees - agenda - help	Searching for employees' profiles (rubric "employees") to find out the personnel data, (locations, telephone numbers, working hours), field of professional expertise, experience, interests. Finding information on seminars, workshops, training, and meetings (in "agenda"). Searching for help about the functionality of the system.
	External information - market information - diagnose - sites	Searching and downloading information from the on-line facilities. Searching for information in the internal database system. 'Diagnose' from sub-company [A] about insurance products.

Knowledge bank (access from the portal)	Themes - mobility (5 sub-divisions) - recreation (6 sub-divisions) - houses (7 sub-divisions) - others (2 sub-divisions)	Searching for information on specific interests, in two possible ways: the type of insurance (in "themes") and special functions (in "subjects"). Submitting (publishing) new information in the form of documents, questions, or comments for discussion. These operations are also specified based on interests, by either the type of insurance (in "themes") and/or the special functions (in "subjects"). Submitting reactions, comments, or questions is possible for all types of input. All inputs are marked with the date and the name of the author.
	Subjects - organisation & policy (+3) - product & processes (+6) - internal statistics - methods & techniques - distribution (+2) - projects (+4) - legislation (+2) - market information (+3)	

Table 5.2. Description of the functionality of the KennisNet system

The system was designed to give technical support to several knowledge activities. From the user perspective, working with the system implied four different levels of operation, ranging from passive through to active-creative:

- reading, searching, getting information from the data bank;
- publishing, or submitting new items;
- editing, commenting, discussing the existing information;
- discussing, asking, answering questions; requesting information from colleagues.

All inputs were performed through the KennisNet portal, and all the items were then kept in the knowledge bank.

5.4.3 Enabling collaboration

KennisNet enabled one type of collaboration. It had the characteristics of attached groupware and supported balanced interdependence. Most of the time, employees worked with KennisNet individually, making inputs-outputs. There was little direct interaction between the members of the group, but they were interdependent in the sense that every incorrect contribution to the system could create problems for others. Even a small inaccuracy in the data, once discovered, would make all the inputs questionable. Task performance did not necessitate regular or frequent interactions, they occurred occasionally as and when there was a need to share information.

5.5 ADOPTION OF KENNISNET BY THE USERS

A description of group learning processes is provided based on the discourse analysis of the interview transcripts and field notes. We will portray those processes (collective acting, group reflecting, knowledge disseminating, and sharing understanding) and then rank them in accordance with our operationalisation scheme from "low" to "high".

We have distinguished two periods in the adoption of KennisNet: the first month of using the system, immediately after its introduction (time 1); and then a period 6-8 months later when the situation with the use of KennisNet was stabilised (time 2).

Collective acting

The users acknowledged that they opened and worked with the KennisNet system only irregularly:

> "Usually I work with the system once a month. We were asked to put our plans in the KENNISNET. Also I sometimes read the news" (Willem, product manager, contact person, sub-company [C], P-2).
>
> "I sometimes read it by accident, but not regularly. Mostly I read the basic items. It might be interesting, for example, to see some developments in the insurance sector" (Rob, product manager, sub-company [B], P-7).
>
> "Almost nobody makes inputs, it's a pity. Sometimes, I watch the KennisNet, read information there and I do nothing more" (Marijke, assistant product manager, contact person, sub-company [B], P-11).
>
> "I check it out once or twice a week" (Kent, insurance technical specialist, sub-company [C], P-14).
>
> "I haven't really used it yet. Maybe, I look at it once or twice a week" (Romke, actuary specialist, sub-company [B], P-15).
>
> "I use it to look for telephone numbers" (Ine, project team member, P-18).
>
> "Since it was implemented in April, I haven't used it at all. I checked it once" (Roel, actuary specialist, sub-company [A], P-20).

The analysis of the entries recorded by the Lotus Notes application has revealed the following occurences of working with the technology in 1 month:

- Opening/ reading / searching for information in the data bank–369 registrations
- Submitting documents–33 professional reports
- Asking questions–7 items
- Discussion–4 items
- Commenting on other documents–12 items.

Out of all the services offered by the system, the users had noticed that the most popular activity was searching for and reading information. Initially, searching for information was active and purposeful. After a short period, however, this became less true. The users admitted that they read information in KennisNet by accident, and not after looking for it purposefully. The most popular knowledge item was a sort of a reference book with pictures of the group members, their job specifications, and addresses. In particular, new employees who had recently joined the community liked to work with this application in order to get acquainted with their colleagues:

> "If I were to look at the KennisNet it would help, but I don't look. I think I am not mistaken if I say that not many of us use the system" (Saskia, product manager, sub-company [D], P-5).
>
> "I might say that mostly we use KennisNet as a reference book to find information about our colleagues in other business units" (Sander, product manager, sub-company [D], P-6).
>
> "There is a very good opportunity to look in the KENNISNET system in order to see pictures of colleagues, to learn about their specialisations, fields of interest, etc. I find it very attractive,

but I never make any inputs into the system" (Wim, actuary specialist, sub-company [B], P-8).

A less popular activity was publishing, or submitting documents. We discovered only two employees who were enthusiastic enough to make inputs into the system. Most of the published information concerned professional reports for each sub-company about different insurance products: we discovered 33 official reports published within 12 months from October 2001. These types of documents were submitted at the request of the project manager.
Submitting other documents based on users' own initiatives was exceptional: only two such documents were published. First, sub-company [C] had made an input describing their experiences in trying to switch clients from one insurance product to another. Almost all employees had read this material and found it very useful (but nobody had made comments in the system). The second informal input was a report about price differences and volatility; published on the initiative of one of the KCS members (also no comments were published).
In third place, in terms of operations with KennisNet, was asking questions: but there were only seven questions asked through the system in a complete year.
Requesting information, editing documents, commenting, answering questions, and discussing existing documents–did not take place actively through the system. Only four entries were made under the heading "discussion". Two examples are the comments below made by employees:

> "I remember that at the beginning I put information in the system and started to wait for reactions from colleagues… I looked every day, hoping to see a response, but nobody reacted. Of course, after a while, I even stopped checking" (Martin, product specialist, contact person, sub-company [A], P-9).

> "There was recently a question about car insurance regarding bonuses for driving without accident in the system. There is a rule–if you drive a car for 3 years without an accident, you get a bonus. The question was about the rule in Belgium. In Belgium they do not use such a bonus system. Why? What do they have instead of it? Still, there is no answer in the system" (Frank, project team member, P-12).

The most popular entry made by a product manager from sub-company [A] was made on the 10 Sept 2001 under the heading "Gemeentelijke herindeling gemeente Den Haag"– it attracted 5 comments dated as follows: 10 Sept 2001 (2 entries), 19 Sept 2001, 4 Dec 2001, and 11 Dec 2001. This was in the first two months of operating KennisNet. We did not find a more popular entry in the data bank.

Group reflecting

The most active reflecting took place during the first three-four weeks immediately following the introduction of KennisNet. The users discovered technical mistakes in some applications. They wrote about this to the project leader, and the mistakes were corrected. Initially (October/November 2001) they discussed the usage of KennisNet in groups of two or three close colleagues–within their sub-companies. Discussions concerned a surprising discovery–the system appeared to have a different meaning to what they had expected. They talked with each other about the system, discussed the items in it (what could be added or removed). But already by November 2001, during a face-to-face workshop, nobody attended the session dedicated to the use of KennisNet. Since then, none of the group members have been willing to talk about KennisNet.

> "Among my closest colleagues we used to talk about KennisNet. But now we are at such a stage that we don't even want to talk about it. I think, it's useless now even to spend time for such discussions" (Joost, product manager, sub-company [D], P-3).

> "In general, it's hard to say that we have discussions about the system. Nobody attends them–in my view it is boring. I can recall some discussions at the beginning about it, I even remember that the decision was taken "to use the system", but it did not help. Once, during

> one of the workshops, one of the assignments was to suggest how the use of KENNISNET could be improved. That was a free assignment for those who were interested in the topic. However, nobody even chose to discuss this topic" (Saskia, product manager, sub-company [D], P-5).

Some of the employees tried to analyse why they did not want to discuss KennisNet. Two reasons were mentioned: firstly, uncertainty regarding on-going organisational changes in InsurOrg left no room to talk about KennisNet; secondly, they were not used to openly discussing difficulties with each other.

> "In my view, the use of KennisNet is related in one way or another with the large changes the whole company is now facing. These changes are also interrelated with the knowledge centre. I think that everybody has a feeling that something is going to happen, but what exactly– nobody can answer precisely. This feeling creates a special atmosphere in which nobody is willing to talk about KennisNet" (Frank, project team member, P-12).

Only the contact persons from each sub-company continued to discuss KennisNet applications and ways to force its use. They appeared ready to continue the dialogue on this subject.

Everybody compared KennisNet with other knowledge management systems in their sub-companies, especially initially. In particular, when starting to talk about KennisNet, they switched the conversation to the advantages of another system. They were ready to chat about the characteristics of EVI, ROLLS, DIAGNOSE, NieuwsNet and other existing IT. They explained that it was easier to use their own old IT because there the information was sufficient, well-structured, and reliable.

> "We have some IT programmes: campaigns development, marketing analysis, Intranet (news, communication within the unit, actions, update important documents). We have our Handbook in an electronic version. In my view, KENNISNET stands just beyond all the other IT programmes. Why should we use it?" (Teo, product manager, sub-company [A], P-10).

> "KennisNet needs to be followed up and updated. Just like the system that we use here, ROLS. We use this when we want to compare our products with other similar products from other companies" (Marcel, product specialist, sub-company [A], P-13).

> "We have an electronic support for informal communications in our sub-company. "C-table" is a forum for discussing problems and complaints. We also have a NieuwsNet in which announcements of births, birthdays, and marriages are placed. NieuwsNet is also based on Lotus Notes" (Kent, insurance technical specialist, sub-company [C], P-14).

> "If I need information related to the competition, I use another help tool that was developed by IFC, a company in Assen. It is a program that provides comparative information about the products, premiums, and costs of different insurance companies in the Netherlands. I think the other product managers use it also" (Klaas, product manager, sub-company [B], P-19).

> "I think the system must be actual and updated. For example, we work a lot with the Internet: this helps to get data and information which is always up-to-date. When I need such information, I will always go to the Internet, and not to KennisNet" (Erik, product manager, contact person, sub-company [E], P-21).

Only during the interviews did we discover that some of the employees experienced problems in using the system, but they never discussed this and preferred to ignore KennisNet. One of them gave an example that she could not find a document and decided to forget about it instead of asking for help. Two other acknowledged that they were confused by the classification of items in the portal, and did not want to try to understand it.

> "For me, KennisNet is not completely logical. You have items in accordance with a product classification accepted in the organisation. But the system is confusing for me–I don't know where to search for information. However, to be honest, I have never discussed such ideas in our group" (Koos, KCS manager, P-4).

"Informally sometimes we have discussed the irrelevancy of the system. The information is not relevant, not up-to-date, not reliable–I then wonder what to share. Actually they gave another meaning to this system…" (Rob, product manager, sub-company [B], P-7).

"It is not clear how to put things there. There are nine categories but it is not clear which one to use. There are overlaps in subjects, for example, you get information about car insurance from a competitor, but you don't know where to put it–i.e. in mobility, or competitors' info, or any applicable category" (Ine, project team member, P-18).

Knowledge disseminating

In fact, hardly anybody asked a colleague to demonstrate how to operate KennisNet. But all of them were sure that it would not be a problem to find help at any time regarding use of the system.

During face-to-face discussions at the beginning, the employees came up with many proposals on how the use of KennisNet could be improved. The list of concrete ideas reflected the state-of-the-art of the system and included 28 creative proposals. To summarise, they have proposed:

- publication of regular overviews of the group activities;
- improvement in the search for technical possibilities (www, Intranet);
- hyperlink with www bookmarks about other insurance companies;
- hyperlink with electronic communication tools;
- publication of daily insurance news;
- signals about new items in the system (symbols, sounds);
- classification of news items;
- notification of the latest questions from colleagues;
- attachment of the handbooks from all the sub-companies;
- a reports generator based on various inputs;
- a start-up function;
- the labour division regarding competitors: based on the insurance product;
- rules to publish a solution following a telephone conversation–for other colleagues;
- regulations to stimulate the answering the questions;
- the appointment of an employee responsible for the maintenance of the system.

Some examples from the interviews:

"Systems like our internal one should be available at KennisNet. Maybe it's a good idea to put DIAGNOSE into the KennisNet. When we develop a new product, it's nice to know about other business units. I am sure that other units have interesting experiences to discuss" (Marijke, assistant product manager, contact person, sub-company [B], P-11).

"The problem is that not everybody looks at the system. We don't have clear rules or agreements on how to operate with the system. I think it would be a stimulating factor if we had some regulations such as: "If you administrate these kinds of documents, you must look at these items in KennisNet, or you must make inputs" (Frank, project team member, P-12).

"We have an e-mail system: Lotus Notes. We send each other messages as well as documents. Actually this is one possibility for KennisNet: it could be used as a means for sending documents to each other. Or the documents that we send each other could be placed there" (Marcel, product specialist, sub-company [A], P-13).

"The information from the Association of Insurance Companies is very important for us. We have to know what is happening with this association and what their actions are with regard to changes in governmental laws, policies, etc. This kind of information should be placed on KennisNet and it needs to be followed-up and updated" (Marcel, product specialist, sub-company [A], P-13).

> "You need someone for one day per week to put information into the KennisNet. Maybe it can become a success if we can have someone responsible for it, to phone people, to ask for info, etc., and put this on KennisNet" (Ine, project team member, P-18).

> "I had the idea to divide our search for our competitors' business based on the types of products, not based on the competitors' company. Currently everybody has tasks that require looking at several competitors in the non-life insurance field. I propose to look at all competitors, but only within one non-life product. We need to restructure our knowledge" (Erik, product manager, contact person, sub-company [E}, P-21).

These proposals, however, were not put into practice at any level. Nobody took the initiative to discuss them further and, as a result, they remained only ideas.

Sharing understanding

All the non-life insurance professionals understood the goals of KennisNet correctly, albeit with different emphases. The majority of them talked about the short-term goal of the system–technical support for information/knowledge. The long-term goal–development of group competence–was mentioned by fewer employees. The ultimate goal of KennisNet, team building, was not that clear to the users–only two people mentioned it.

> "KennisNet was introduced to bring knowledge specialists together. We thought that everybody would benefit from the expertise of their colleagues" (Frank, project team member, P-12).

> "The goal of KennisNet is to exchange relevant information: about products (for the product managers), about pricing (for the actuaries). We all are part of InsurOrg, so we can learn from each other. Finally, it must be a large 'back-up' of all sorts of relevant information for all the people who deal with the non-life insurance business" (Romke, actuary specialist, sub-company [B], P-15).

> "I think there are two main goals. The first goal, which you can say is the 'background goal' is to create a community feeling … that we are one company. The more concrete goal is to get people to know each other, to learn from each other, to know what each other is doing, what others have to do in the other companies, to learn from this and to use it in their own work" (Rina, project team member, P-16).

> "I don't know why it was introduced…" (Erik, product manager, contact person, sub-company [E], P-21).

All of them mentioned the fact that they felt a strong need for a knowledge management system and that they actively supported the introduction of KennisNet. However, after a short period of trying to operate with it, they realised that they did not need the system as it was designed.

Understanding how to operate KennisNet was not clear to all users: we found three groups:

- those who understood the system properties fully and quickly ("I think I know well the possibilities and technical characteristics of KennisNet. If I needed it, I would use it", Erik, product manager, contact person, sub-company [E], P-21);
- those who did not have an opinion and were even confused by our question regarding their understanding of operating KennisNet ("I cannot say if I know KennisNet … I have not been very interactive with the system", Marcel, product specialist, sub-company [A], P-13);
- those who acknowledged that they did not understand how to work with the system ("At this moment I don't even know exactly what I can do with this system", Wim, actuary specialist, sub-company [B], P-8).

The users' attitudes towards KennisNet showed that KennisNet did not meet their initial expectations. They found the reference book the most attractive idea. In addition, they

mentioned that the idea of storing information was interesting and could be useful. It was helpful that an opportunity existed to collect data about competitors.
The technical functionality of the system was perceived as not sufficiently sophisticated and even primitive. The content functionality appeared to be complex: it was difficult to search for information; it stood alongside other IT programmes. And, most disappointingly, it did not facilitate interaction (it was always easier to phone one another than use KennisNet).
Talking about the future state of KennisNet, most of the non-life insurance employees were very careful in expressing their opinions. They kept on saying: "I would be optimistic IF…" Some of them said directly that they did not see a future for such a system:

> "I have a good feeling regarding the future of such systems, but some decisions must be taken by the top management" (Sander, P-6).
>
> "I cannot spend time waiting for somebody to reply. I prefer a telephone call. That's why I don't actually believe in the future of this system" (Wim, P-8).
>
> "If it was up to me, I would prefer to use only the 'news' rubric, and the address book out of all the items in the system. The discussion forum won't work ever" (Martin, P-9).

Mutual adjustment

The group members did not set up concrete activities in order to improve the use of KennisNet. Initiating instructions, organising discussions, meetings, or inviting IT experts– never took place at the users' initiative. We discovered that only the contact persons tried to organise additional meetings, but this did not work out. All activities were planned in advance by the KCS, and the users preferred to follow.
The non-life insurance community developed one rule concerning the use the system. They divided the task of analysing their competitors' businesses among the sub-companies, and agreed that all such news should be published in the system. Twice, during face-to-face workshops, they formulated an agreement, which sounded vague–"everybody should use KennisNet and make inputs". Once, the contact people attempted to have a meeting dedicated to the on-going use of the system, but that idea failed. For the rest, there were no formal or informal, written or spoken, rules on what to publish in KennisNet, or when. The employees expressed the view that they missed "common standards, or accepted rules" (Joost, product manager, P-3) on operating with the system. They stressed the need to develop such regulations and came up with examples such as: publishing results in KennisNet of insurance analysis should be one of the job tasks; reading and commenting on others reports should also be obligatory; describing methods of composing reports should be published as an attachment. However, they did not attempt to implement their own ideas and rules.
The members of the KCS often had informal micro-discussions on evaluating the use of KennisNet. They acknowledged the lack of system usage, but we did not discover any systematic evaluation. The non-life specialists were hardly involved, and nor were they encouraged to evaluate the intermediate results of the use. The contact persons noticed that after each small 'stimulating' discussion there was a slight growth in inputs to the system. We did not discover any other attempts at intermediate evaluation.

5.5.1 Group processes: summary

We saw that group learning within the group had been moderately strong immediately after the introduction of KennisNet. However, already after one month of using the system, it changed its direction and fell back; and after 6-8 months it had become mostly weak.

Operations related to making inputs became the exception. The users acknowledged that the use of KennisNet was too low. Most of them were only talking about searching for information–and not publishing it. In fact, knowledge "exchange" became one-way. Requesting information, editing documents, commenting, answering questions, submitting new items–all became exceptional actions. Group reflecting among the employees was highest during the first 3-4 weeks of using the system. They talked with each other, discussed the advantages and difficulties in KennisNet, and the extent to which the system could support their tasks. However, this communicating process decreased to an indifferent level after one month.

Proposing new actions and ideas in order to improve the usage was very strong at the beginning. This indicates users' readiness and willingness to work with the system at the outset of the project. We observed that the leaders did not take these proposals seriously; and the users themselves did not attempt to be more active and apply them. Users' attitudes towards KennisNet reflected two main views: the 'static' applications (knowledge database) were considered as good, whereas the 'dynamic' applications (discussions) were considered as not good. The needs for the system moved from high to low, or even to no need at all. We did not discover any concrete activities aimed at agreeing on how to use the system. Evaluation took place only among KCS members. They acknowledged the lack of usage, but did not make a systematic evaluation themselves, nor did they involve users in such evaluation rounds.

In summarising all the observations, we reach the following conclusions. The employees had initiated the introduction of the KennisNet system and participated in the development of its functionality, and this explains their enthusiasm once the system was installed. However, soon they started questioning the job relevance of the technology, which seemed to be different from what they expected and not really supportive for their tasks or in their collaboration. As a result, discussions about KennisNet turned first to criticism and attempts to improve the system, and then to a silent indifference.

We gave qualitative labels to the group learning processes among the KennisNet users twice, at the beginning of the implementation and after 6-8 months. This allows us to qualify the processes as having deteriorated as follows:

- Collective acting–from moderately active to passive
- Group reflecting–from strong to mostly weak
- Knowledge disseminating–from intensive to moderate
- Sharing understanding–from moderate to low
- Mutual adjustment–remained weak.

The group learning processes deteriorated and this led to a shared view of the non-relevancy of KennisNet for the job. An interesting observation was that some of the employees even started to believe that the system was not easy to use (even though Lotus Notes technologies are nowadays not difficult to use). This shared opinion led to an action–the non-use of the system.

Why did this happen? There are several possible reasons that could explain a negative curve in group learning: the users' perceptions about their own needs changed, or they did not know exactly what they needed, or KennisNet did not meet their needs. Whichever, we can assume that: (1) as in the first case study, there was an obvious

discrepancy between the goals of the system and the needs of the users; and (2) a needs analysis was not properly completed, neither before the introduction, nor during the on-going use of KennisNet.

Now we will look at what was done in order to keep the implementation running. What did the project leaders attempt in order to achieve their goals with the introduction of KennisNet? The next section discusses these issues.

5.6 MANAGERIAL SUPPORT

To continue our understanding of the KennisNet implementation, we shall now look at the managerial support from five perspectives: the authority and responsibility given to the employees in their use of KennisNet; the availability of different learning opportunities to practice with the system (formal and informal); the level to which learning and use of KennisNet were recognised and rewarded; the willingness of the managers to help and support the end-users; and time allocated to exercise with the system and discuss difficulties. In this section, we will first describe the managerial support provided by the project leaders in the KennisNet implementation, and then, in the next subsection, summarise our observations.

Autonomy and responsibility

All the interviewees emphasised that they were not restricted in their use of KennisNet. They were free to choose whether to use it or not, when to use it, and for what purposes. They could decide for themselves and plan all the actions undertaken with the system.

However, some of the users noted that at the beginning there was a rule: all documents must be sent to the managers who would then make the inputs into the system. The employees even found this attractive–they did not "have troubles" with the system itself (Saskia, product manager, P-5).

The managers stressed the voluntary basis of the use of KennisNet. Officially, the employees did not need permission to publish documents in KennisNet. However, some of them felt that they had to discuss the content of the documents with their immediate manager before publishing them in KennisNet. Possibly, there was no encouragement for all information to become public across the five sub-companies.

Promoting different learning opportunities

Before KennisNet was introduced, there was a workshop in which the specifications and functionalities of the system were introduced and clarified. The majority of the employees perceived this as sufficient and clear, although some of them noted that it was "not very intensive" (Sander, product manager, P-6), and "could be better" (Joost, product manager, P-3). It was the only formal training on KennisNet offered to the users. We found that some of them did not even remember this had occurred:

> "I don't remember any special educational activities around the introduction of KennisNet" (Willem, product manager, contact person, sub-company [C], P-2).

> "As an introduction, I had two hours of instruction. It could have been better, I must say. I realise that better instructions and education would have helped more" (Joost, product manager, sub-company [D], P-3).

> "We had training at the beginning, but not very intensively. It was an overview of the possibilities in the system: you can do this and that…. Then, when we started our attempts to work with it…" (Sander, product manager, sub-company [D], P-6).

For new users, who came later to the non-life insurance community, there were no such formal instructions, but only demands from the project leaders to make inputs.

Immediately after the technical installation of the system, everybody got an e-mail massage with information about KennisNet–when and how to start using it.

The project leader composed a manual on how to work with KennisNet: with detailed information about the portal and the data bank, and all items and applications. However, there was no description of the goals of the system, of work situations when it would be wise to use KennisNet (and its various items), of targeted groups of users and their information needs covered by the system, rules and recommendations on how to work with it (what to input, and when), and so on. Many of the users found that manual helpful; some of them noted that there was no need for a manual at all; others did not know or could not recall such a document.

The project leader was always ready to help, but the atmosphere did not support informal education about KennisNet. The users emphasised that they had formal official meetings in which to discuss issues with the system, but nobody mentioned other discussion opportunities. Usually they had meetings with preset agendas and with all the employees together. More open meetings, with feedback from the employees in small groups did not take place.

Feedback

None of the users could recall comments on their work with KennisNet: no remarks, no rewards. As an example, an actuary specialist was once asked by the project leader to publish a document in KennisNet: she sent that document to him (instead of directly inputting it to the system), and never heard anything back. She did not even check whether it was published or not.

The project documents mentioned a rewards system to encourage the use of KennisNet but, in practice, it was not developed and implemented. Many users noted that they would like to have more feedback, comments, and tips from the project leaders on how to work with the system.

Management style

The employees acknowledged that, if they had difficulties or questions, they usually sent e-mails to the project leader and were sure to get help from him. At the same time, the users commented that they did not feel much sense of enthusiasm from the managers. Only the project manager kept on insisting, pressing, and requesting the users to make inputs in the system. However, as described earlier, the KCS members were not empowered to force the specialists to use the system.

> "There was a mismatch between what the managers were asked to do, and what they really could do" (Rina, project team member, P-16).

The direct managers of the users in the sub-companies had a different attitude towards KennisNet: all of them knew about the system, and probably about its intention, but they did not stimulate its use.

The system seemed to be designed and introduced at the request and based on the ideas of the non-life insurance professionals. However, there was no deep investigation into their ideas before the installation of the system: what kind of information they actually needed and for what purposes.

We did not discover any negotiating processes during the use of KennisNet. The project team knew about some difficulties and complaints from the users, but they did not speak out and did not discuss them openly with the users. One of the main reasons mentioned for this was a lack of managerial authority and budget.

Time

All users claimed that they did not have time to work with KennisNet. It is likely that the organisational restructuring process and the uncertainty about the future negatively affected the current working situation in the group. Employees felt a lack of time for voluntary activities such as operating KennisNet. Their expectations were that KennisNet would save time but, in practice, on the contrary they had to invest time.
Managers had no time specifically allocated for discussions about KennisNet.

5.6.1 Managerial support: summary

In our view, the managerial support provided to the KennisNet project was inadequate. The emphasis was on voluntary and free work with the system, but this freedom was harmed by the fact that some of the employees felt the need to consult with their direct bosses about the content of documents to be published. At the same time, the members of the KCS stressed the absolute freedom and permission for all kinds of publications. Education on KennisNet could be considered as indifferent: one official workshop with instructions for the whole group, one introductory e-mail message to everybody from the project leader, and a distributed manual also composed by the project leader. These were the main educational events. Feedback from the project leaders was mentioned in only one of the project documents. In practice, there was no recognition of the users' progress and initiatives in working with KennisNet.

Based upon the above descriptions, we gave the following qualitative labels to the managerial support in the KennisNet project:

- Autonomy and responsibility–high
- Promoting various learning opportunities–inadequate
- Feedback–weak
- Management style–moderate
- Time–insufficient.

We are convinced that the weakness in managerial support did contribute to the failure of the project. It should have started from the analysis of the users' needs–what was the essence of what they expected to gain by working with the additional digital DocuShare system? The idea of installing a system in order to build a sense of a team certainly came from the project leaders and not from the end-users. The latter probably needed a well-working shared information space to benefit from each other's expertise. For this, it would be necessary to have a group of users structured in such a way that they were interdependent in their tasks. Thus, a proper analysis of the division of 'goals and needs', and the structuring of task interdependence in the group of users, should have been the first steps in supporting the project.

There needed to be stronger motivation to encourage voluntary work with KennisNet. However, all the arrangements were general, and lacked individual specifications. They could be applied to any employee in any situation. There was a lack of orientation towards specific personnel and their concrete needs.

The system did not seem to be that difficult. Probably this is why the project team did not advance special training and instructions. Written by the project leader himself, the manual lacked information about *who* should be interested in KennisNet and *why* they should work with it. It failed to address the professional interests, tasks, and responsibilities.

However, we recognise that the management style of the KCS leaders was the direct result of on-going organisational changes and uncertainty within the company. They were volunteers in this project themselves, without the power needed to apply the desired ideas. On the one hand, they were willing to help the employees and wanted to build up the non-life insurance team, but on the other hand, they were not the line managers of these employees. As a result, the cooperation between the project leaders and the users was encouraging rather than formal and structured.

5.7 SUCCESS OF THE KENNISNET IMPLEMENTATION

We have shown that the members of the group of KennisNet users had diverse task designs, software experience, that the two subgroups (product managers and actuary specialists) had little common expertise to share through the technology, and that the group as a whole did not have much coherence. We have seen that the group learning processes receded over time: from a highly enthusiastic usage at the beginning to non-use after some months. We have also seen how the managerial support given to the users during the implementation process was not strong.

Now we will describe the results of the KennisNet implementation. To do this we first talk about the efficiency of the project in terms of the budget, the time and the number of employees who got used to the system, and then we will look at how skilfully and task-consistently the users operated the system.

5.7.1 Efficiency

Based on the field notes, interviews, and the records in the KennisNet logs, our overall view, that the non-life insurance specialists tried to actively work with KennisNet only during the first month, and that after a while the usage fell off dramatically, is supported.

The analysis of the entries recorded by the Lotus Notes application has shown that during a one year period only 59% of the group members opened the system at least once. At the same time, the project leader made 33% of all inputs. On average, every month, there were only five inputs. The most indicative characteristic is that none of the group members were willing to publish documents, but did hope that their colleagues would. In terms of the budget, we should emphasise that this project did

not get a special budget, but was a zero-cost initiative from the project leaders. Overall, we assess the implementation as inefficient.

5.7.2 Stable use

We provide data on the stable use of KennisNet once the employees had been using it for six months. Analysis of the discourse data concerning stable use of KennisNet is presented below.

Firstly, in this section, we describe the stable use components, and in the next subsection we summarise their most important points and rank the components according to our operationalisation scheme: from "high" to "low".

Ease-of-use

The employees complained that they could not publish quickly in KennisNet. They had first to go through several steps before even 'clicking the buttons': careful selection and scanning of documents, or even composing a new one, discussing with their immediate manager the possibility of sharing that information with the whole group (or with a limited selection); and only after that came the technical steps, which had other constraints such as searching for a suitable place to publish the document.

> "It doesn't work quickly. First, I have to select the documents very carefully. Then I have to scan the paper documents. Then, to go through certain procedures and steps in KennisNet, etc. Even with e-mailing it is much easier" (Saskia, product manager, sub-company [D], P-5).
>
> "But still–you have to go through many screens before you find what you really need. You can scroll down all the items in the storage, it's too long by the way" (Teo, product manager, sub-company [A], P-10).
>
> "The manager asked me once to put the information in the product pallet. But you have to realise that it is a lot of work. You have to gather information, make a schedule for it, classify the information, etc. It takes a few hours to do that" (Marijke, assistant product manager, contact person, sub-company [B], P-11).
>
> "Now I am used to operating with KennisNet, it's easy, without problems. I cannot say how long it took me to get used to the system, but I think not too long" (Willem, product manager, contact person, sub-company [C], P-2).
>
> "About being easy to use ….well… it is easy to put something on the KennisNet, the categories are good, but sometimes it is not clear where to put it. Also the keyword search… you are free to choose. I find it difficult to put something there. I think it could be better" (Ine, project team member, P-18).

They were not enthusiastic about the interface–it did not seem to be sophisticated enough, not very friendly, and involved a lot of screens and steps. The structure and the content of the interface were even confusing; there were overlaps between the specialisation subjects (for example, 'boat' products could be found in both the transport and recreation items).
Searching for documents was not without difficulties either. The search engine of the system was limited and worked only within one application (for example, if a user looks for documents in the KennisBank, the system will only search for items within KennisBank, and not across all applications). Posing questions (or comments) met similar difficulties: the employees did not know for sure where to place their questions or comments, but more interestingly they did not know where to look for the answers.

"It seems fine although it is not sophisticated enough" (Klaas, product manager, sub-company [A], P-19).

"I think it is poor. When you want to ask a question, it does not point you towards the proper place to put your question. It is not possible to find out if there have been any reactions to your question." (Jan, actuary specialist, sub-company [E], P-22)

"There are nine categories but it is not clear which one to use. There are overlaps in subjects…" (Ine, project team member, P-18).

"Also I find KennisNet to be not very interesting, not attractive. I mean that, again, the Internet looks much more interesting, for example. However, at the same time, I realise that given the funds for this system, it has developed well. It looks in accordance with the given budget…" (Erik, product manager, contact person, sub-company [E], P-21).

Task-system fit

We did not discover any positive expressions from the users concerning the importance of KennisNet for their job tasks. All of them were critical. The shared belief was that the system did not help in producing insurance products or processes; it was not relevant for the individual job tasks or for the exchange of information.

All the members of the group commented on the inadequacy of the data in KennisNet. It was not 'in-time'. Often the employees needed information, or answers to their questions, immediately (for example, to respond to a request from the Call Centre). In such situations, they preferred to phone an appropriate person so as to get the response when they needed it. When the situation did allow a wait for information, some of the users did put questions in KennisNet. However, there would be a long period before anybody would publish an answer. Related to the 'time' issue, was the problem of outdated information. The materials, even the news, were not maintained.

The quality of information remained a challenge. The employees even expressed the view that they would not expect to find information concerning 'difficult and problematic' issues. Some of the specialists lacked information concerning their specific topics such as garden insurance. Containing 'heavy' reports, the database lacked working papers, papers-in-progress, or descriptions and tips on how to prepare reports.

"I don't use the system, but it could be a special situation due to my professional interests. There is not much information regarding caravan insurance. I know two colleagues, in other business units, who are also busy with caravan and boat insurance. I prefer to call them and discuss the necessary questions" (Saskia, product manager, sub-company [C], P-5).

Finally, the users themselves questioned the quality of the information in KennisNet. They acknowledged that it was not easy to rely on the inputs in KennisNet. Moreover, they felt that not all information could be submitted to KennisNet (such as data about new premiums, business reports, customer feedback) since this information was perceived of as too confidential to be published in a document sharing space open to all the sub-companies.

"Another point is the 'quality' of the information you get in the system. You have to rely on the expertise of your colleagues. Everybody has to perform tasks at a high level, because you do it not only for yourself but also for others. That is something everybody should take very seriously, in my view" (Sander, product manager, sub-company [D], P-6).

"Some of the documents which are published by the specialists are not completely correct. This creates a question–should I spend any time at all reading them if I am not sure of the correctness of the material?" (Frank, project team member, P-12).

There were two underlying reasons for the mismatch with the usual way of working in the non-life insurance group. Firstly, the necessity of having information 'right now', without any

delay. Hence telephone and e-mail technology, or even face-to-face talks, were more supportive. Secondly, the 'competitive climate' among the sub-companies, and the perceived confidentiality of some documents, reduced the desire to share knowledge.

> "I look at the system if I have a simple question that requires a simple answer. But if I have a more complex and difficult question, then I don't use the system" (Klaas, product manager, sub-company [B], P-19).

> "An issue is what to publish, the content of inputs. Most of the time you see only the results of somebody's work in KennisNet. It would be interesting to know how and in what context they were reached, and this is never in the system" (Frank, project team member, P-12).

5.7.3 Implementation success: a summary

After six months, the frustration of the users with the technology reached a level that they did not see any job relevance in KennisNet. The technology was perceived as a non-useful system: it did not support the execution of tasks in the non-life insurance group, the information published was not available in time, it was out of date, and did not cover specific or difficult issues.

Based on the descriptions above, we rank the stable use components as follows:
- Ease-of-use–mostly low
- Task-system fit–low.

The employees also shared the opinion that KennisNet was difficult to operate, even though it was built on top of the existing Intranet in InsurOrg. The users preferred to phone each other and send e-mails rather than interact through KennisNet. The failure of the project became obvious.

5.8 ANALYSIS OF THE INSURORG CASE STUDY

5.8.1 Trustworthiness of the case study

Before summarising the findings, we must pay attention to the trustworthiness factors influencing the reliability of the gathered information and conclusions (Lincoln and Guba, 1985).

We used the same tactics as in the first case study in order to ensure the quality of the data and the information collected:
- prolonged engagement (Gardner, 1993),
- persistent observation (Tashakkori and Teddlie, 1998), and
- member check (Lincoln and Guba, 1985).

The quality of the findings and conclusions is, we believe, adequate because:
- *Use of triangulation techniques*. By following the same case protocol, we conducted the research methods as we had in the Medinet case study.

Qualitative methods were mainly used (interviews, observations, and document analysis).

- *Discussions of the results*. All the intermediate results were discussed with KCS and the group of contact persons. We had four meetings with the KCS members concerning ongoing research, and we made four presentations on this for different target groups. We ended our case study with a final presentation for the whole non-life insurance group, where everybody could ask questions. Finally, the materials of the presentation were published on the KennisNet system.
- *Peer debriefing* (Lincoln and Guba, 1985). We have already noted that two researchers were involved in this case study. Together we strived to get better insights into the implementation of KennisNet. To understand each other's views and evaluate the findings, we made a comparative analysis of our conclusions in order to achieve a common language and comprehension of the reports.
- *Expert debriefing*. The results were discussed and confronted with the opinions of the researcher who was involved in the KennisNet project from a KM perspective (Dignum, 2004).

5.8.2 Discussion

We started this case study with the knowledge that the KennisNet project had failed shortly after the introduction of the system. A stable non-use of KennisNet had lasted for almost one year. The users did not make inputs in the system, and it was even difficult to initiate discussions related to KennisNet.

How does our theoretical approach help to understand what happened in InsurOrg with the KennisNet system?

The technology was introduced to the employees as an optional medium for sharing their expertise and knowledge. Looking back at the history of the project, one must acknowledge that the non-life insurance professionals initiated the design and development of the technology themselves. Probably the users had professional interests in such a system, but the official goals of introducing KennisNet became the following: providing technical support for information exchange; promoting collaborative knowledge creation; and supporting community building among the non-life insurance professionals. These goals were communicated to the end-users, but we have to doubt whether the employees became committed to such goals.

What did the users experience immediately after the system was introduced to them? Luckily, no changes in their job tasks were required by the system. At the same time, the project leaders pressured the group to share information and develop group competence. What kind of information to share, with whom and why, was not clear– and it was not obligatory. Maybe there was a hope that people would regularly publish interesting news in KennisNet–but it did not happen. So, right from the start, the users were disappointed with their own creation. It did not fit with their expectations. The feelings about the uselessness of KennisNet grew daily.

As a result, the employees reached the opinion that the system was of no use. It seemed to work too slowly: publishing documents took too much time due to the careful selection and scanning required of the documents to be shared. An unsophisticated interface resulted in additional efforts to find information in KennisNet, and to place documents, questions, or answers. Overlaps between the insurance subjects that appeared on the screens of KennisNet, and technical limitations in searching for information, complicated its use. Information published in the system could not be relied upon as it was often outdated, irrelevant, and did not help in producing and monitoring the non-life insurance products and reports. The users shared the opinion that there were no real benefits for them to be gained from making inputs in KennisNet.

This means that, unfortunately from the very beginning, the group of KennisNet users developed a negative group feeling about both the implementation and the job relevance of the system.

What can be said about the group itself? The group had 34 members, geographically distributed in five sub-companies of InsurOrg. Within this group there was a large diversity in job tasks rooted in the differences between the sub-companies' work rules, traditions, tasks divisions and performance logistics. The two professional sub-groups, product managers and actuary specialists, did not have a task-related basis for sharing information. We found that the employees' expectations from the technology were not clear, they could not state them explicitly but only talk about their hopes of getting tips and advice on how to make statistical reports, calculate new premiums, and convince clients to accept new products.

We did find one structural arrangement to create a *group* and to advance group knowledge: every sub-company had a contact person as a representative of the entire group in the non-life insurance circle. These contact people took on tasks to improve the use of KennisNet. We did not find any other special structural arrangements in the group. The tasks that the employees performed through the system were not interdependent: there were no joint projects where the employees would feel a strong need to collaborate and would appreciate each others inputs into the system. With this, we again observed, as in the first case study, a discrepancy between the actual task interdependence in the group and that required/offered by the system.

Non-structural devices of the group included some interesting developments such as strong subgroup cultures (per unit); the experience of being together as a group for two years; some knowledge of each others strengths, backgrounds, and interests; strong team building activities initiated and organised by the leaders. Before the introduction of KennisNet they had already developed ways to communicate with each other on various professional topics.

What else did we observe? We saw that a negative impression of KennisNet continued to develop. Discussions about possible improvements to the system, initially active and enthusiastic, soon turned to users' frustration and then to silent disinterest in the system and the project in general.

To evaluate group learning we use qualitative labels ranging from 'high' to 'low' (i.e. active-passive, high-low, intensive-fuzzy). The labels were derived from our

operationalisation scheme, where 'high' learning reflects an intensity in the users' activities and orientation towards improvement of the system's adoption.

In the first case study, we had discovered that group learning has a potential to develop. In the second, InsurOrg case study we wanted to explore this finding further and see the dynamics of the group learning processes and its different components in more detail.

	Group learning–first month of KennisNet use	Group learning–after 6-7 months of KennisNet use
Collective acting	Active (at the 'reading' level)	Passive
Group reflecting	Strong	Mostly weak, indifferent
Knowledge disseminating	Intensive	Moderate
Sharing understanding	Moderate	Low
Mutual adjustment	Weak	Weak

Our analysis has shown that four steps in group learning in the non-life insurance community developed very actively during the first month. Immediately after the introduction of the system, employees started to operate with it enthusiastically. Right away, they communicated about KennisNet: comparing it with other existing systems, talking with the project leaders, discussing it during the workshops. Knowledge dissemination in our view became a strong process during the first month. We found many constructive proposals from the users for improving the use of KennisNet. We classified these proposals in three groups: improvements to the technical properties, to the organisation of the information being published, and for establishing group regulations concerning the use of the system. The employees well understood the goals of the system and its functionality; however, they did not see their needs reflected in the system. Mutual adjustment became the bottleneck to learning in the non-life insurance group. We did not discover any real activities to put these proposals into practice or initiate new agreements. There were no formal or informal, written or spoken, rules aimed at developing group rules, or evaluating intermediate results. Nor were training sessions arranged on the use of KennisNet. Even at the beginning, when the group was enthusiastic about working with KennisNet, mutual adjustment was weak.

The processes progressed from a high to a lower level, and could be characterised as a regression in group learning. We noticed that the number of operations registered in Lotus Notes (inputs, readings, etc.) declined, especially of those that implied interactions–discussions, comments, questions and answers. The employees gave up proposing ideas for system improvements and discussing its use. They began to express the view that they did not need such a system and their opinions about KennisNet became very negative.

In discussing the managerial support for the KennisNet implementation, we note that the non-life insurance specialists were given a large amount of freedom, authority, and responsibility in using KennisNet. However, at the beginning, some of the employees felt limitations concerning the content of published documents. Education about KennisNet can be considered overall as indifferent rather than oriented towards

individual needs. Informal learning (on-line chat, small discussions) did not take place at all. Written by the project leader himself; the manual lacked information about the relationships between job tasks and KennisNet. We did not discover any rewards for using and mastering the system. The project leaders were themselves volunteers in this project, and without any real power to take the desired decisions. On the one hand, they were willing to help the employees and wanted to build the team but, on the other, they were not the direct supervisors of the employees.

The next section presents the results of the analysis of the constructs in the research model that we believe will help to draw more specific conclusions about the case study.

5.8.3 Analysis of the constructs in the research model

We will review the relevancy of the components for the constructs of group learning, managerial support, and stable use.

In order to estimate the relevancy of the components (in group learning, managerial support, and stable use constructs) for the research model, we will combine two perspectives: firstly, the research value of the discourses from the interview transcripts, ranked from "low to high"; secondly, the linguistic and contextual features of these text units which can sometimes bring additional connotations to the components (as was explained in Chapter 3).

As in the first case study, we have viewed every component from four angles:

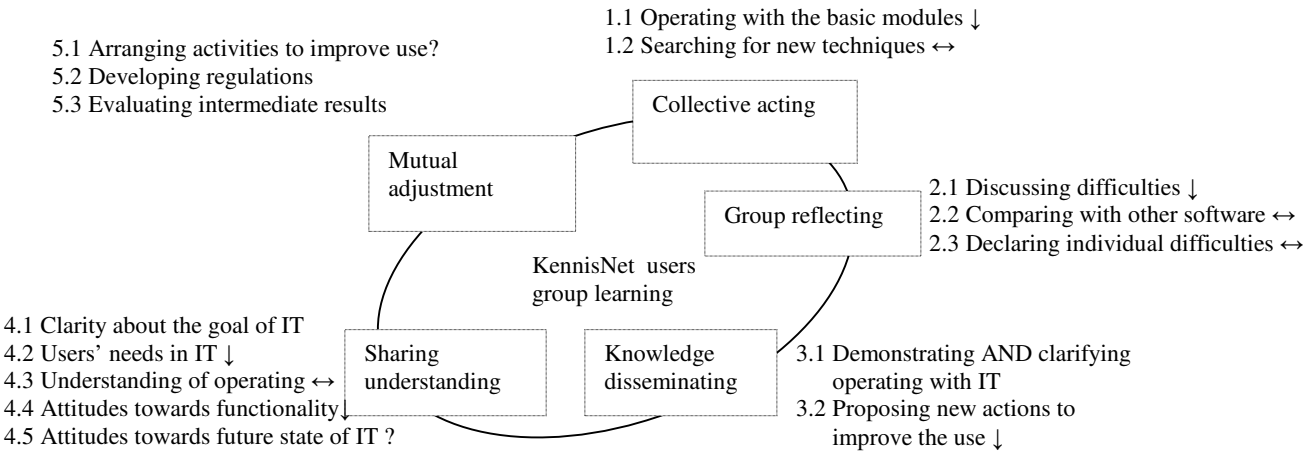
- The total number of analysed text units that represent a certain component.
- The qualitative labels, or ranks, which were applied in the descriptive part of the case study: strong, moderately strong, moderate, mostly weak, weak.
- The linguistic features of each text unit for its significance for a certain component.
- Where applicable–the historical and contextual characteristics that contributed to the evaluation of the component and the dimension as a whole.

Such a sophisticated analysis allows one to refine the components in the research model on the basis of the InsurOrg case study. Further, we observed that:

- On the basis of the analysis, some components in group learning, managerial support, and stable use constructs could remain unchanged in the model, in line with the operationalisation scheme;
- Some components could be combined in pairs;
- There were also components that did not find support (text units seemed to be vague, not clear, mixed up with other ideas, or interviewees attempted to skip that topic during the conversation).
- In the group learning construct, we saw that some components had a potential for further development: that they were not fixed. In this case study, it was a negative development, from a high to a lower level.

Below, we illustrate the results of the analysis of the three constructs: group learning, managerial support for the KennisNet implementation, and its stable use.

Figure 5.2 represents the findings from our discourse analysis of the *group learning* components. 198 text units were analysed.



"?"–a component had no support in this case study but is retained until the cross-case analysis
↓–the observable trend within a component
↔–no apparent progress within a component
AND–two components were combined following the analysis

Figure 5.2. Refined Group Learning components in the KennisNet implementation

Figure 5.2 shows that two components out of the fifteen considered (attitudes towards the future state of the system, and arranging activities to improve its use) received little empirical support and did not come through linguistically. Therefore, we marked them as "questionable" until the cross-case analysis.

Two other components (demonstrating how to operate the system, and clarifying difficulties in working with the system) received significant support but it was difficult to differentiate one from another and so we decided to combine them into one, again until the cross-case analysis. The rest of the components remained unchanged, and were thus operationalised as before.

We observed a negative development in the following five components of group learning:

- operating with basic modules in everyday task performance,
- discussing difficulties in use with the system,
- proposing new actions in order to improve the use of KennisNet,
- users' needs in the technology, and
- attitudes towards the functionality of KennisNet.

In the 74 text units referring to the construct of *managerial support* we found three "questionable" components: consultations and informal learning, having time to discuss the system, and managers' time allocated for end-users (see Table 5.3). The rest of the components remained unchanged and valid.

Autonomy and responsibility	responsibility of the end-users in decision-making freedom in use of IT authority in planning work with the system
Promoting learning opportunites	formal training sessions availability of material resourses consultations and informal learning ?
Feedback	recognition of progress in use of IT rewards
Management style	willingness of managers to help and coopertae with end-users consideration of users' ideas
Time	having time to practice having time to discuss the technology? managers' time allocated for end-users to discuss implementtaion issues?

"?"–a component had no support in this case study but is retained until the cross-case analysis

Table 5.3. Refined components of Managerial Support in the KennisNet implementation

The analysis of the 74 text units reflecting the *stable use* construct revealed two "questionable" components: the speed of operating with KennisNet, and the perceived quality and availability of information (Table 5.4).

Having finalised the analysis of the components in the research model, we can see that the InsurOrg case study has contributed to further refining the research model. In total, the relevance of seven components has been marked as "questionable": three components from the managerial support construct, two components from the group learning construct, and two components from the stable use construct. However, as in the first case study, we will postpone final judjment until after the cross-case analysis.

Ease-of-use	Perceived speed of operating with the system? no difficulty in operating friendliness of the interface
Task-system fit	percieved importance of the system for the tasks percieved quality and availability of the data for the members of the group ? percieved match of the system with the ways of work in a group

"?"–a component had no support in this case study but is retained until the cross-case analysis

Table 5.4. Refined components of Stable Use in the KennisNet implementation

5.8.4 Conclusions and refining the research model

The second case study was an investigation into the implementation of a knowledge management system in the group of non-life insurance specialists in InsurOrg. The introduction of the system was a zero-cost initiative by the Knowledge Centre Schade that was given the priority task of developing joint competence among the non-life insurance professionals working in five different locations.

Using traditional terminology, KennisNet could be labelled as representative of Document Sharing systems. Its main roles, in InsurOrg, were threefold: to provide technical support for information exchange; to promote collaborative knowledge creation; and to support community building among the professionals in non-life insurance who had once been competitors. It allowed users to operate on four levels of activity, ranging from passive to creative: reading, submitting, editing, and discussing documents.

KennisNet did not demand changes in the job tasks of the users: there were no changes in task performance, responsibilities, control, or interdependence. The system supported balanced interdependence, i.e. it provided the opportunity to share knowledge. Users could work with the digital documents individually, without direct interactions with one another. However, incorrect information could cause problems for others. The reality of their daily work was that employees did not have joint projects or other structural arrangements that necessitated working together in a shared workspace.

Although KennisNet was built on top of Lotus Notes, a well-known Intranet technology in InsurOrg, some employees had difficulties in operating it from the very beginning. The ontological domain was not clearly structured; items were mixed up, without guidelines on how to find them. The non-technical side of publishing documents included many steps: selecting a document, reviewing it, improving and discussing it with the direct supervisor. The information published in the system was not in time, outdated, and did not include specific and difficult issues. Therefore, there was no strong basis for sharing information through the system. Right form the start, KennisNet was perceived as a non-useful system. People preferred to pick up the phone, as they were already accustomed to do.

The group of users–34 members–was established two years before the introduction of KennisNet. It included professionals from five, formerly independent, insurance companies that used to be competitors. This history contributed to a reluctance to share expertise. There were no divided, prescribed, or operationalised interdependent job tasks in the group that could bring employees together in a structured way.

After the users got KennisNet, they did start to operate and discuss it. The results have confirmed, as in the first case study, the existence of group learning processes, through which the employees developed their adoption of KennisNet. Moreover, in this implementation, this group learning ‘emerged’ immediately after the introduction of the new system. We could again distinguish all five steps: collective acting, group reflecting, knowledge disseminating, sharing knowledge, and mutual adjustment. The non-life insurance community demonstrated that its group learning processes

included: operating with the KennisBank and the Portal; reflecting upon this experience through discussions; providing comparisons, proposing new actions, regulations, and design ideas to improve its use; and planning further implementation. We again confirmed our view that group learning was related to the interaction processes between group members, through which they develop interpretive schemes about the technology that can help to improve implementation.

This case study provided a wonderful opportunity to observe the dynamics of the group learning process. We saw that, at the beginning of the project, the end-users had high expectations of the technology. They initiated its introduction with the idea of benefiting from each other's expertise. However, within the first month of using the system, employees started doubting the job relevance of KennisNet. Such doubts grew quickly and, after two months, nobody was working with this technology. The users did not want to work with the system, nor talk about it, or ask any questions. They became indifferent to possible improvements in the project, their attitudes turned from high expectations to deep misgivings about the system and its future. In other words, we observed a negative development in group learning.

This finding supports one of our conclusions from the first case study: that group learning can itself develop during the adoption of groupware. In this case, we saw that it deteriorated and in the end stopped altogether.

We saw signs of group learning regression during the early stages of the implementation. These signs, we believe, clarify how the group learning took the 'wrong' direction. The signals of the negative development of group learning among the non-life insurance workers were:

- a decline in operating with the basic modules (based on observations and analysis of the entries recorded in the technology);
- a decreasing intensity of discussions around KennisNet (the employees became indifferent to starting and maintaining discussions);
- a halt in proposing new ideas to improve the technology (the users did not come up with new proposals and refused to discuss earlier ones);
- more negative attitudes towards the system's functionality (the users expressed their negative views about the system, its interface, content and technical characteristics);
- users' doubts about their needs for the technology.

We observed that these processes cumulated in harming the image of the technology and the interpretive schemes that led to the increasing non-use of the system.

The system was supposed to facilitate knowledge sharing. Research in the field of knowledge management provides sufficient evidence to show that knowledge can only be shared on a voluntary basis–one cannot use authority or power to force people to share their knowledge and expertise. For this reason, the KennisNet adoption needed very careful managerial support oriented towards encouraging group processes and psychological safety.

We have examined the activities which were aimed at supporting the implementation of KennisNet. Only one of them was promising: employees were given full authority and freedom to work with KennisNet. However, other helpful arrangements such as

education and training possibilities, feedback from project leaders, and time to practice and discuss KennisNet, were insufficient. The managers were willing to promote the use of the system, but they were not empowered to force end-users to work with KennisNet. Learning possibilities (the manual and instructions) were not sufficiently specific: they could have been applied to any knowledge management system in any group and in any organisation. In addition, there were no arrangements in place for newcomers in the group to learn KennisNet. There was no feedback to the end-users on their work with KennisNet in InsurOrg, although this could have encouraged users to make inputs in the system and share their expertise more.

As in the first case study, we again observed a lack of analysis and clarifying of job relevance, in terms of the technology, for the users before the technology went live. As a result, we saw a discrepancy between the goals of KennisNet and the users' needs with it. The needs of the KennisNet users were not analysed prior to the system introduction at all, and the goals of the technology were not carefully addressed and communicated. Further, as in the first case study, we saw that neither the job tasks to be performed using KennisNet, nor the task interdependence and information to be shared in the non-life insurance group, were structured and operationalised.

We believe that even under the difficult circumstances of the KennisNet project, the implementation of the system would have been improved if group learning had been stimulated. This could have been done in various ways such as:

- Clarifying and hence gaining acceptance of the goals of KennisNet by all members of the group,
- Negotiating employees' expectations (for example through discussions about objectives and possibilities to improve the technical limitations of KennisNet),
- Addressing all the ideas and questions about system use in the group,
- Developing rules on working with the system (such as publishing summaries of documents instead of full reports, circulating notes after meetings, distributing group news),
- Dividing responsibilities between the group members regarding their work with KennisNet (evaluating knowledge items, making Insurance News overviews, evaluating competitors' business per company or per non-life subject),
- Opening discussion forums in the system for each insurance specialisation,
- Establishing regular evaluation rounds on the ongoing use of the system and publishing reports in KennisNet.

Although this list of recommendations is in no way complete, it does demonstrate how group learning can be stimulated and oriented towards adoption of the system.

In summarising the conclusions from this case, we would emphasise the following points:

- the goals of the system were not transferred to the level of the users' needs, and their job tasks and their interdependency were not operationalised–this together reduced the job relevance of KennisNet from the start;
- group learning emerged immediately after KennisNet was introduced to the users, and it started from the disappointments of the users with the low usefulness of the technology;

- frustrations about the technology led to the 'negative' start to the group learning processes; all the interactions and reflections about the system in the group became oriented *against* adopting KennisNet, this resulted in regretting even a well-known Lotus Notes functionality;
- our observations showed that the lack of strong structural characteristics in the group such as tasks divisions and interdependency outweighed the very important non-structural devices, and negatively influenced group interaction;
- the discourse analysis revealed that the negative development of group learning in the non-life insurance group was mainly caused by the failure of the knowledge acquisition processes in the group learning cycle: collective operating, knowledge disseminating, and sharing understanding;
- the negative development in the group learning processes could be seen by the decrease of operations with the basic modules, the decline of proposals to improve the use of IT, and the growing recognition of the uselessness of the technology;
- full freedom in the use of the technology required special and very careful managerial support for the users; the voluntary use of IT needs to be based on a high job relevance of the technology;
- the case study has shown the importance of managerial issues such as negotiating expectations during implementation, individual orientation of learning opportunities, and the need to provide support for newcomers to the group;
- the case has confirmed that users' participation in an IT project does not alone guarantee a successful implementation.

To summarise our findings from the InsurOrg case study we have refined the preliminary research model and combined all the findings in one view (Figure 5.3).

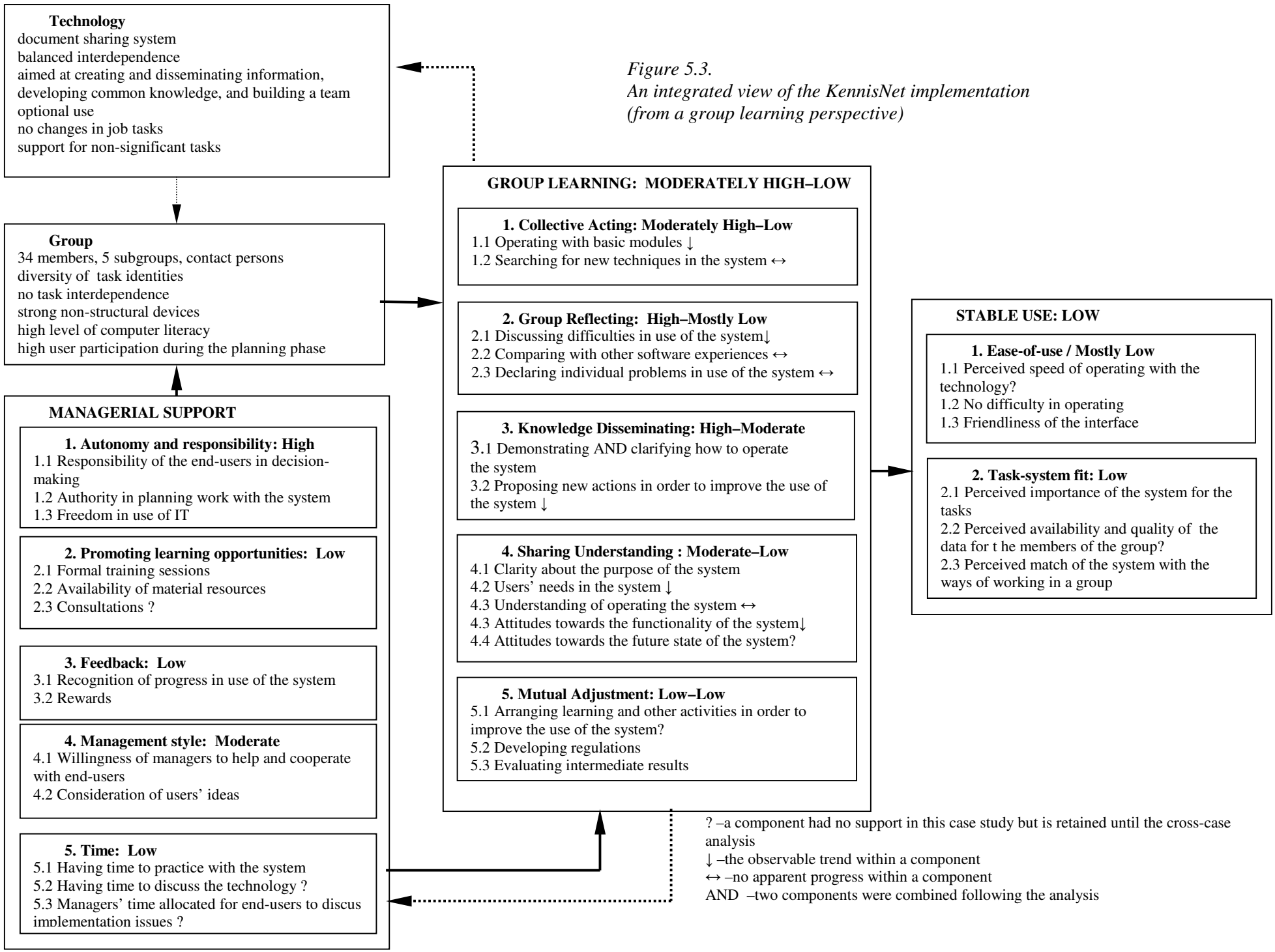


Figure 5.3.
An integrated view of the KennisNet implementation
(from a group learning perspective)

6. ACADEMCENTRE CASE STUDY – IMPLEMENTATION OF THE PERSONNEL ADMINISTRATION SYSTEM SAP_HR

"Do you really want to study this project?.. Ah… Strength!"

From the interview with the former project leader

Our third case study was conducted in "AcademCentre", one of the Higher Educational Institutions in the Netherlands. As with many of such institutions, AcademCentre has various units and faculties, which to an extent have different personnel policies, norms, and rules.

Here, we will discuss the process of introducing a new personnel management information system–*mySAP HR*–in different units and faculties of AcademCentre. The introduction of a new system aimed at improving the personnel and salary administration. The end-users (HR professionals) faced the challenge of reassigning their job tasks, building a new HR community in the organisation, and increasing responsibilities for daily HR tasks during the implementation difficulties.

A lack of communication and misunderstandings between the different parties involved in the project led to mistakes in working with the system at the beginning, sometimes giving financial problems for AcademCentre and, as a result, in attempts to slow down the implementation project. However, the pressure from the 'top' gave no other choice to the employees than to struggle on with *mySAP HR*. After improvements in the managerial support, working with the system became easier for the whole group and for the individual users. After eighteen months, the implementation was still experiencing delays and difficulties, but the users had begun to deal with it in a stable way.

6.1 INTRODUCTION

This case study combined the features of the previous case studies we conducted. It concerned the decentralisation of personnel administration in the complex structure of AcademCentre. Within one day, the old personnel system in the majority of the faculties and units was replaced by a new one, and the employees had to adapt to it. The working situation also changed: personnel administrators and salary workers now had to make on-line inputs without sending letters to each other as they had before. A third system (IPA) was involved in the project as the external salary technology for the Dutch governmental organisations. This complicated the situation.

This third case study aimed at further refining the theoretical understanding of the role of group learning processes in IT implementation. We wanted to continue the

observation of group learning dynamics–and its progressive processes. Having recognised that the SAP_HR project did improve after a difficult 6-8 months starting period, we also wanted to look at the managerial practices that influenced the positive turn in the project.

Therefore, the goals of this case study were threefold:

- to exemplify the theoretical discussion about implementation of IT through group learning,
- to clarify the contents of the constructs of group learning, based on the experience of the SAP_HR users, managerial support, and the stable use of SAP_HR, and
- to refine the research model on the basis of the SAP_HR implementation.

We formulated some specific research questions for this case study:

- In what way did the adoption of SAP_HR develop over time through group learning?
- How did group learning develop over time in the group of SAP_HR users?
- What were the signal 'moments' that indicated the progress of group learning?
- Which group learning processes supported or hindered implementation of the system in the Personnel & Organisation (P&O) and Salary groups?
- How did managerial support promote the project?

Continuing to build on our understanding of implementation as group learning, we followed the same case study protocol and here present the story using the same framework as in the other cases.

After describing the research methods applied in this case study, we present the SAP_HR implementation in the following order. First, we describe the organisational context of AcademCentre, the background of the SAP_HR project, and the historical account of the SAP_HR implementation in Section 6.2. The characteristics of the group of SAP_HR users–personnel and salary administrators–are presented in Section 6.3. Technological features of SAP_HR–its modules and the ways in which employees were supposed to use it are discussed in Section 6.4. Implementation of SAP_HR as group learning is described in Section 6.5. We discuss the managerial support for the SAP_HR implementation in Section 6.6. The results of the project, on the success of the SAP_HR implementation, are presented in Section 6.7. In drawing conclusions from the case study, we will analyse and refine the research model. To achieve this, we will discuss the content of the constructs and dimensions components in the model on the basis of discourse analysis. We finalise the case report by 'mapping' the research model and by drawing specific conclusions from the SAP_HR project (section 6.8).

6.1.1 Methods

In order to investigate the implementation of *mySAP_HR*, for six months we carried out this case study. Data collection was achieved using qualitative methods: semi-structured interviews, observations, and document analysis.

24 interviews were conducted, each lasting from one to one-and-a-half hours, totalling 28 hours. Table 6.1 shows the type and number of interviewees.

Representatives of three groups of *mySAP_HR* users were interviewed:

- Five employees involved in steering the project in AcademCentre, referred to here as project team members. They provided support for end-users, the help-desk duties, maintained functional and technical administration of the system, and analysed on-going use of the system.
- Four leaders of the faculties' HRM departments who were responsible for the personnel policy and administration in the faculties. They were not active end-users of the system themselves, but SAP implementation did bring changes in their departments.
- 15 end-users: four salary administrators from the central Salary Department and 11 HR specialists from five HRM departments. The sampling was based upon the intensity of SAP use. We interviewed those HRM specialists whose daily work tasks had to be performed through the system, including five key-users who were advanced users of the SAP_HR system. The HRM departments are labelled as SC_P&O, GS_P&O, SS_P&O, AL_P&O, and A_P&O.

The interview questions were generally the same for all interviewees (see also Appendix 2).

Job position		Number of interviews per unit					Total
		SC_ P&O	GS_ P&O	SS_ P&O	AL_P &O	A_ P&O	
Members of the project steering group		-	-	-	-	-	5
Heads of the faculties' HRM departments		1	1	1	-	1	4
End-users	HR administrators	2	4	2	1	2	11
	Salary administrators	-	-	-	-	-	4
Total							24

Table 6.1. Type and number of interviews conducted at AcademCentre

During conversations with members of the project team we asked about the project steering activities, its history, support provided to the end-users, project lessons learnt, interconnection with other ICT projects in AcademCentre, and future plans. The heads of the HRM departments were asked about tasks divisions and structures of their groups, (re)assignments of the HRM tasks related to the new system and their specification, and the influence of the SAP_HR on departmental performance. The end-users were asked about their group learning activities, the exchange of their experiences with the entire group, and the managerial support they received.

Transcripts of the interviews were checked and corrected by the respondents. Additional information was obtained during informal conversations and while participating in the key-user meetings.

We have also studied relevant documents: the Development Plan of AcademCentre "Perspectief 2010", the Project Plan and the FIT/GAP Analysis in the implementation of SAP HR, the plan for the pilot implementation of SAP HR, Reports and Notes of the key-user meetings (04.02.2003, 18.02.2003, 04.03.2003), a Special Issue of the AcademCentre Newspaper (N26, 2001/02), plus the main manual and 36 sub-manuals covering the use of SAP HR for the AcademCentre.

6.2 THE ORGANISATIONAL CONTEXT

AcademCentre has for centuries had a long history of being a knowledge centre in the fields of scientific research and higher education. Nowadays, it is one of the largest institutions in the Netherlands, with more than 23.000 students, more than 7.000 employees (academic personnel 53%, support and administrative personnel 47%), and a yearly turnover of € 612 million.

The structure of AcademCentre is typical of Dutch universities (Figure 6.1).

It has 14 faculties and four other educational organisations such as the University College and School of Governance. There are various support and administrative services that employ more than 3.000 workers. The Support Service includes 15 units such as Facilities Services and the Botanical Garden. The Administrative Service includes eight service centres such as IT and Personnel and Organisation, and six staff departments such as general administration and the accommodation policy department.

The faculties are headed by deans, appointed by the University Board, which is the highest executive body and is responsible for the university's administrative management. The Board has frequent consultations with the University Council and it is responsible to the Supervisory Board. The Council is an advisory body with 12 representatives from the staff and 12 from the students. The Supervisory Board monitors major developments in the university. The Board deals with certain legal and financial issues such as the approval of the annual budget. In the consultative body the employees and the employers (the University Board) confer on those issues described in the Collective Employment Agreement of the Dutch Universities.

Organisational units are situated in three geographically-distributed locations. The majority of the faculties and administrative services are on the university campus, outside the city. Two faculties and some support services (such as the museum and the central library) are located in the historical centre of the city, and the University College and other support services in the city suburbs.

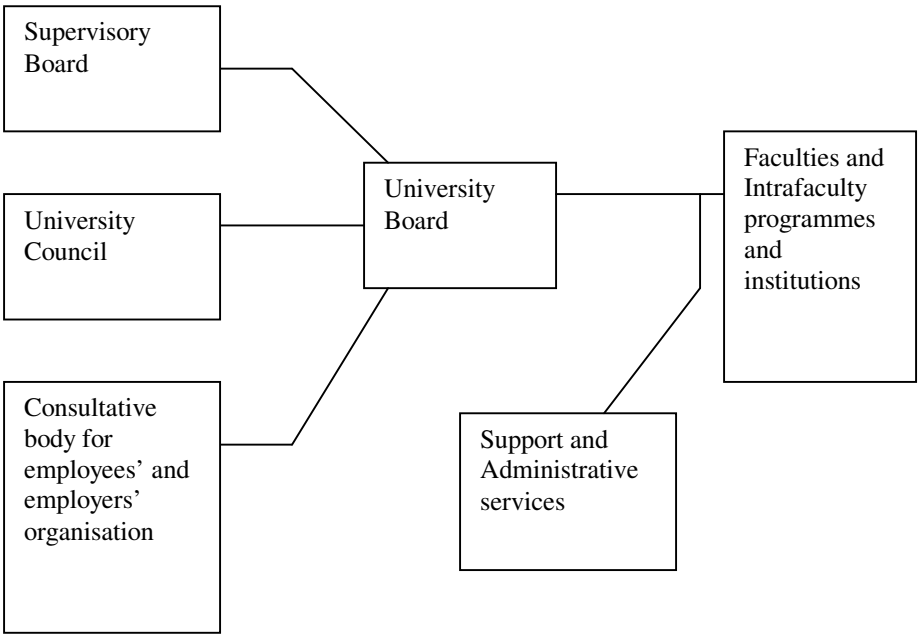


Figure 6.1. The organisational structure of AcademCentre

6.2.1 Background of the SAP_HR project

We found that, since 1994, most of the faculties in AcademCentre had been using a personnel information system COMI-P that had become outdated. The supplier no longer guaranteed on-going updates and further development of COMI-P, and therefore there was a need to look for a new personnel IT system. In 1998, the directors of the faculties and other services decided on the functional demands for a future new system, in which the latter had to meet the following basic requirements:

- to be integrated with the existing financial and salary administration software packages;
- to have clear and well-designed functionalities in the standard version;
- to have a good reputation with other companies and educational institutions;
- to be easily adopted and implemented in the university environment;
- to have guaranteed stability in the future.

On the basis of these demands, in November 2000, the University Board made the decision to choose the SAP_HR personnel management system. By then, AcademCentre already had the financial module from SAP®. By choosing SAP_HR, the organisation hoped for a painless implementation trajectory based on their existing experience with SAP_Financial, and intended to achieve an easy match between the HR and the financial administrations.

From this background–the necessity to replace an old IT and achieve integration with existing systems–AcademCentre, in spring 2001, started the realisation of a project to implement SAP_HR. The project was granted an initial budget of €1 million.

6.2.2 History of the SAP_HR introduction in AcademCentre

As with many other IT implementation trajectories, the introduction of SAP_HR had three main parts: preparation and planning, piloting, and introduction to the end-users. From the various interviews, we gained the impression that the project history had a very thoughtful, detailed preparation (April–November 2001), followed by quick pilots that were evaluated as being very successful (November-December 2001), and finally by dramatic, seemingly endless, chaos after its introduction to all the users (since January 2002).

In the Annual Report on IT (AcademCentre, 2002), under the heading "Administration and ICT" one can read the following statement (http://www.xx.nl/content/Faciliteiten2002.pdf):

> "The implementation of the personnel module within the SAP system reveals more outset problems than was expected, especially in management information reports and matching with the salary administration system."

"Problems in matching with the salary administration system" means delays, mistakes and other difficulties in the payment of salaries. The weekly newspaper of AcademCentre published a small article that depicted such troubles (dated 14 March 2002, No. 26):

> "Tens of employees have got less salary than was ruled… Especially those who had any changes in their contracts since 1 January 2002 and those who had different short-term contracts. From the other side, those employees whose contracts expired on the 1st of January 2002 continued to be paid… According to the project team, the origins of the problems are too complex…"

A historical account of the SAP_HR implementation project is as follows.

In December 2000, AcademCentre started searching for a consultancy firm to help implementation. In April 2001, the consultancy firm "A" was chosen on the basis of its experience with both SAP® and IPA technologies.

The period April–December 2001 was intended to achieve 'fast implementation' of SAP_HR. The steering group looked for discrepancies between SAP_HR and the existing systems. Six project groups worked on different aspects of the implementation: realisation, salary/IPA, acceptance, technique, conversion, and training. One small detail which interfered with the project was that an expert from the consultancy firm "A", who specialised in developing an interface with the external salary system IPA, left the project. In October 2001, pilots took place in four units: the faculties of biology, pharmacy, and chemistry, and the Service Centre P&O. During November and December 2001 all the future users of the system undertook training courses. Preparation was carried out on technical issues such as conversion and transportation.

On January 1st 2002, SAP_HR was introduced in 12 faculties and in all the support and administrative services in the AcademCentre. Two faculties refused SAP_HR, and kept their old personnel systems. In the users' opinions, the introduction date for the new system was not promising: it coincided with the introduction of a new Collective Agreement of the Dutch Universities (which had to be processed through personnel administration). Some units experienced restructuring that further required new paperwork.

Documents show that the evaluation of the implementation was already scheduled for March-April 2002, i.e. three to four months after the SAP_HR introduction. However, shortly after the introduction, and through to the summer of 2002, unexpected difficulties arose related to the inputs and outputs to SAP_HR and with sending data to the external salary system IPA.

The extent of the drama during the first 7-8 months was expressed in various ways. For example, we heard of about 3000 mistakes being registered in the database with only a third being resolved, 450 e-mails in six months from the users reporting problems, 75 "crucial" problems to be resolved, 10-20 technical changes/improvements *per day*, and finally about 300-400 AcademCentre employees who experienced difficulties in getting their salaries.

> "The first months were really terrible. We made inputs in accordance with our experiences and the knowledge we got from the course, but most of the time there were mistakes, and IPA did not accept the data. As a result, the employees did not get their salary. Sometimes it went on for some months. Mistakes could be very simple and unexpected, but they took a long time to search out" (Roy, A_P&O, personnel administrator, P-7).

> "Now I am sure–if they want to do something like this again in the same way–I am leaving. I really mean that! It was just one big disaster from the beginning. People did not get any income for three months. It was terrible and unclear who was responsible for what. Many HRM specialists became sick…" (Erik, SS_P&O, key-user, P-9).

We did not observe a 'happy end' to the SAP_HR implementation during our six months of involvement. However, at least we know that the number of employees experiencing problems with getting their salaries had decreased from 300-400 in spring 2002 to 60-100 in March 2003.

In order to study the implementation process we first had to delve into the field of HRM and salary administration tasks in AcademCentre. What were the tasks of the targeted employees, especially those whose work involved SAP_HR, and what was the uniqueness of the entire user-group?

6.3 CHARACTERISTICS OF THE TARGETED EMPLOYEES

In this section, we shall present the targeted employees: the salary and personnel administrators in AcademCentre who became the core users of SAP_HR. According to our theoretical framework the group characteristics might influence the group interaction processes, and this is why we first look at what kind of a group was expected to use SAP_HR.

In advance of the discussion, we should note that we found a large difference between the "pre-SAP" and the "post-SAP" group of users. In fact, there was no pre-SAP group: there were salary administrators and personnel administrators who worked for different units within AcademCentre but never worked closely together. After the SAP_HR introduction, most of their tasks became interdependent through the system and this forced them to grow into a group.

6.3.1 The structure of the emerging group of SAP_HR users

SAP_HR users only formed a group structure because of the introduction of the system. After SAP_HR was introduced on January 1st 2002, the HRM specialists were forced to collaborate with each other. In total, the group had about 50 members. They worked for six different AcademCentre units: four Personnel & Organisation departments (P&O) from the faculties, the Service Centre P&O, and the central Salary Department.

In terms of the SAP_HR implementation, each sub-group had two types of users: 'regular' users and 'key' users. Each P&O unit had at least one key-user who was responsible for correspondence with the project team, helping 'regular' users, searching for new possibilities in the system, and attending special meetings.

We saw that the emerging group of 50 SAP_HR users consisted of sub-groups of different size, each with their own traditions and idiosyncrasies, and each with regular and key users. How was the communication organised? We observed three ways: through key-user activities, through meetings, and by telephone.

Once a fortnight, meetings of key-users took place with a representative from the SAP_HR functional administration. During such meetings, all the issues that had been reported as a problem in SAP_HR were reviewed and various questions discussed. We attended two such meetings and analysed the overviews of the reported problems. We observed that solutions to some problems were found immediately whereas others took 2-3 months to solve. Key-users did play an important role in the implementation trajectory, and in the group itself. They became a sort of users' representative for the project administration, and the main channel for experience exchange between the units.

The functional administrators of the system became an external advisory body for the group. They did not become formal leaders of the group, but they did help the users with all the difficulties with SAP_HR: they knew every user, and were familiar with all the problems in using SAP_HR. The functional administration team also intermediated between the group of users, the steering committee, and the consultancy firm.

In addition to the meetings with the functional administration, all the users had the possibility of communicating by e-mail or telephone. There did not appear to be a special e-mailing list to simplify communication lines, but interviewees did refer to a helpful list with the telephone numbers of the users who had special expertise, for example in IPA functionality, CAO à la carte, or HR issues.

To summarise: the user-group had an amorphic structure–50 members, 5-6 key-users, no leaders but the functional administrators as outside 'advisors', with communication mainly through the key-users after their meetings.

6.3.2 Non-structural devices of the group of SAP_HR users

Being young, the group of SAP_HR users tended to reflect thoughts and traditions 'per unit'. During interviews, we noted that the users from each unit had similar internal opinions about project issues. Thus, users from GS_P&O were very critical about the meetings of the key-users, whereas from SC_P&O they stressed that all the SAP changes were initiated in order to decentralise salary functions and 'distribute' salary employees around the faculties' own P&Os (we did not find an evidence for this). Users from SC_P&O were all critical about the system manuals.

Initially, the users from the different units were not willing to communicate and share experiences. Firstly, they did not know each other; and secondly, they had no time to communicate because of the sheer number of problems. Gradually, communication improved with the help of key-user meetings and e-mails. A year from the system introduction, we observed that the whole group knew each other well, they knew the expertise of each member, and felt safe to bring up questions they wanted to discuss. Some of the users had their individual preferences with whom to talk or discuss SAP_HR issues. For example, one of the P&O units had regular tea-break events with users from the Salary Department.

All the interviewees referred to three key-users who became informal leaders of the group. They, for example, provided the University Board with the annual personnel reports.

> "There is a core group of three persons from three different faculties, who are raising the questions or problems, and at the same time represent the advanced SAP users. It is obvious if they ask a certain question, or insist on a proposal, that it should be taken very seriously" (Erik, SS_P&O, key-user, P-9).

In summarising the structural and non-structural characteristics of the group of SAP_HR users, we would stress that these characteristics had to develop during the implementation process. The members of the group did not know each other before the SAP_HR introduction, since they worked for different and remote P&O and salary units in AcademCentre. The units differed in terms of their work traditions, norms, cultures, and idiosyncrasies. These factors explain the complexity and difficulties faced by the end-users when they had to become one group.

6.3.3 Tasks and responsibilities

Let us take a look at what kinds of tasks the targeted employees were supposed to go on-line with, and to what extent they were interdependent. In AcademCentre, the salary processing involved two parts: (1) the personnel specialists from the HRM departments who generated the personnel data and sent it to the central Salary

Department, and (2) the central Salary Department who used that data and processed the salaries for all employees of the university and sent them to IPA.

Tasks and responsibilities of personnel administrators

Personnel administrators were busy processing changes in the personnel files of the AcademCentre employees. These files were either paper-based or based on SAP_HR.

We have found about 40 tasks performed through SAP_HR that can be grouped into ten sets: (1) appointment of an employee (sub-tasks concern appointment of a new employee or an external worker, declarant, stagier, and those with nil-contracts); (2) modification of basic information, payment information, working time registration, and other data; (3) relocation processing; (4) promotion; (5) work time registration; (6) administration of leave (sabbatical, sick, parental, abroad with/without conservation, and pregnancy); (7) processing the optional model for employment conditions which is only in part executed through SAP_HR; (8) administration of declarations; (9) vacation allowance; (10) making HR statistical reports and information management reports (sick leave reports, and HR financial reports).

Besides HR administrative tasks performed using SAP_HR, there were others not connected with the system:

- Communication with employees (telephone calls, e-mails, sending official letters)
- Maintaining personnel files
- Administering conference/ congress leaves.

We discovered some variation in the five units:

- The number of employees working in the P&O units (SC_P&O–11 employees, SS_P&O–9 employees, A_P&O–9 employees, GS_P&O–5 employees, AL_P&O–1 employee);
- The number of employees who made inputs to SAP_HR (SC_P&O–all employees, SS_P&O–3, A_P&O–2, GS_P&O–3, AL_P&O–1);
- In some P&O units all employees performed all HR administration-related tasks, while in others only some were responsible for communicating with the employees of the faculty while others performed the tasks of key-users of SAP_HR;
- The functions of key-users were also assigned differently: for example, in SC_P&O, all employees could represent the unit as its key-user, while in others there were strict divisions.

As we found out from the interviews with the heads of the P&O departments, every faculty had its special characteristics that influenced the HR administration. For example, the “SC” unit was a special structure within AcademCentre that provided P&O services to more than 400 employees including those in three faculties and more than twenty administrative and support services such as the AcademCentre library, museum, and communication department. Another example is the “GS” faculty where there were lots of declarants who worked for a short period of time and did not get a regular salary. In general, student assistants were registered as declarants in this

faculty as in many cases they were appointed to execute special tasks within projects. Of about 320 employees, one-quarter were declarants.

These two examples show how the task division differed per unit based upon variations in the idiosyncrasies of the faculties. Therefore, the ways of processing HR information also differed.

Tasks and responsibilities of salary administrators

Salary administrators processed the salary data and then sent it to the external IPA central salary system. The full chain of the salary administration process is illustrated in Figure 6.2:

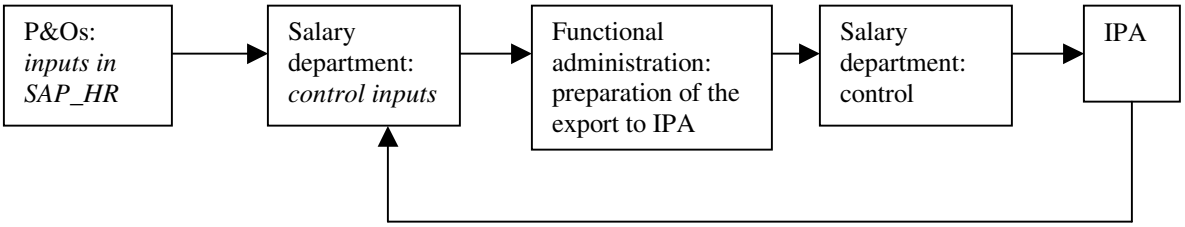


Figure 6.2. The salary administration chain at AcademCentre

As shown in Figure 6.2, the salary department was responsible for ensuring that the IPA system got the correct information from AcademCentre. Therefore, salary-related inputs were checked and controlled twice in the chain. Another task was communicating with the employees, for example answering questions concerning salaries, and sending letters at the end of contracts.

In addition to the standard salary processing, there were unusual personnel administration tasks that included processing the salaries of those employees who were not registered in IPA (at the beginning of the SAP_HR introduction there were 100-150 such employees), and of those who were registered in IPA but due to administrative problems received no salary, and of those who did not want to be insured. To ensure that employees of AcademCentre in unusual situations got their salary, their data was sent to yet another external system called “Prima”.

To complete the picture we should note that there were still two faculties who refused to accept SAP_HR and went on working with their old P&O system. They continued to send paper-based data to the salary department, and the salary administrators had to process it in the old way.

P&O and salary administrators had a strong task-related basis for sharing their expertise and collaborating. Their tasks were tightly interdependent: the outputs from the P&O employees were the inputs of the salary administrators. This collaboration became stricter in the post-SAP situation because the technology was very much standardised and would not accept even small spelling mistakes in the files.

6.3.4 Software experience of the users

All users had general computer literacy. As we have mentioned, before SAP_HR they worked with another personnel ICT system: COMI-P. At the same time, there were users with more advanced software experience, among them the key-users of whom three had an IT background. In the SC_P&O unit, the personnel worked with a self-developed programme for the CAO à la carte administration.

Besides SAP_HR, the administrators from three of the targeted units also had to work with other software programmes related to personnel administration. In AL_P&O, there was a separate program 'Atra' for sick leave and time registration, and in the salary department the employees processed all their unusual cases through the 'Prima' program.

The existing software skills were, on average, not that high among the users but sufficient to run SAP_HR.

6.3.5 Intention of SAP_HR for the users

We will now describe the intended changes for those units in AcademCentre that had to work with SAP_HR after January 1st 2002. In the pre-SAP situation, there were three different systems in AcademCentre involved with the personnel and salary administration (figure 6.3):

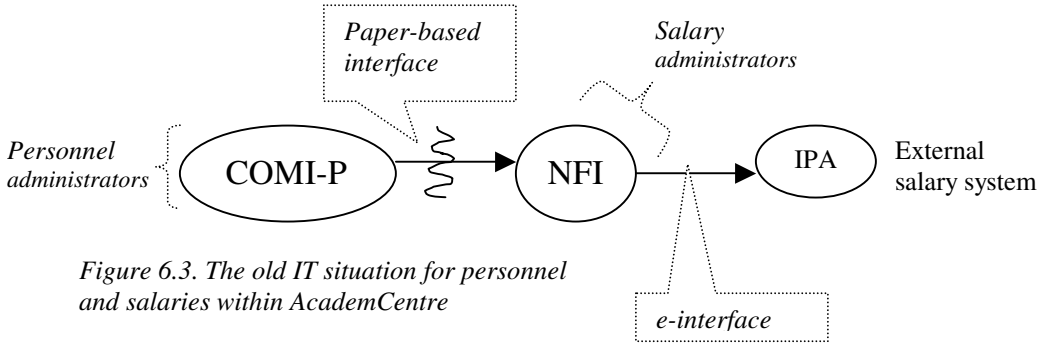


Figure 6.3. The old IT situation for personnel and salaries within AcademCentre

- The P&O system, COMI-P: personnel employees used to input personnel data, print it out and send the paperwork to the central salary department;
- The salary systems, NFI and IPA; salary employees used to get paper-based documents from personnel administrators, check them manually, and input the data into NFI. All the salary inputs from NFI went to IPA who then calculated the final gross and net salaries and sent this information back to AcademCentre.

In the new situation, there were only two systems, SAP_HR and the external IPA, that were involved in processing personnel and salary documents (Figure 6.4). All the documents were processed electronically, without posting paperwork. Personnel and salary administrators used the same system–SAP_HR–but with different functionalities. All transactions made by personnel administrators that had to be sent to IPA by the salary administrators were immediately stored on-line.

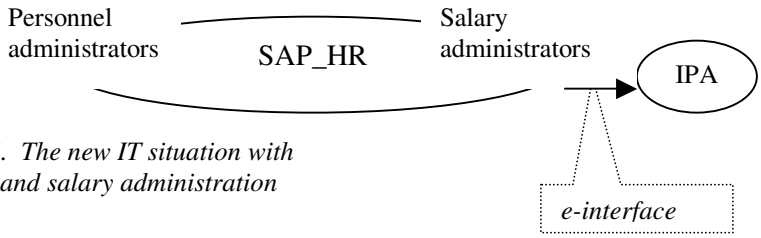


Figure 6.4. The new IT situation with personnel and salary administration

The paper-based interface disappeared, changing the link between personnel and salary administrators. The digital connection "NFI–IPA" also disappeared so that the salary administrators now faced the IPA directly, without an intermediate NFI system.

The interviews with the SAP_HR users have shown that an apparently straightforward technical intention has brought with it many social changes. We have combined these into five groups:

- Firstly, P&O administrators got increased responsibilities for the transactions they completed; as one of the personnel administrators noted:

  "With SAP we got extra control, and more responsibilities. We have to be very careful with all inputs. Earlier everything was on paper, but now we have to concentrate more intensively in order to avoid faults" (Roy, A_P&O, personnel administrator, P-7).

- Secondly, as the former leader of the project stressed, the new situation required changes in the mental frames of the personnel administrators:

  "The preciseness, control and calculations were never the strongest point of the personnel specialists. Their work was not about salaries or calculations but about the personnel policies in the faculties. The SAP_HR demanded from them to be accurate and exact in filling in all the small details… That was out of their ordinary way of working. Such calculations and preciseness were more usual for the salary people" (Joost, former leader of the project, P- 20).

- Thirdly, the task interdependence has changed radically. Instead of being concerned only with internal paperwork in the faculties, now all the inputs made by personnel administrators became interdependent with the inputs by the salary administrators, and eventually with an IPA system that is outside the organisation.
- Next, unlike the old situation, on-line working with personnel and salary documents implies standardisation and operationalisation of the personnel and salary tasks and processes in the entire group of users. We have already discussed how, in the pre-SAP situation, the HRM units had their own traditions and rules. However, the new circumstances required clear definitions of all the terms and processes used. This reinforced interdependency between all the units.
- Finally, extra control was required in order to avoid on-line mistakes. It should be noted that IPA worked in a highly structured and standardised way, and therefore would not accept incorrect or unknown inputs. This had the consequence that extra checks and extra controls were necessary for both personnel and salary administrators. The decision was made that it was necessary to double check all the inputs made in the P&O departments. This

decision was implemented in various ways. For example, in the SC_P&O, all users had equal qualifications and tasks and so there were no strict rules about who should check inputs–any available user could do this and was encouraged to do so. In the GS_P&O, the inputs went through a triple control: a user, then a key-user, and then the head of the department. In the AL_P&O, where one employee carried out all the HR administration, that person had to double check their own work.

The salary administrators also had to process the data in SAP_HR several times: a first set of controls before preparing the information for transport to IPA, and a second set of controls on the same data after it was prepared for transport.

In summarising, we note that the new system, SAP_HR, required increased control over the data input. The users needed to be accurate in making inputs. This led to an increase in users' responsibilities, some cultural change, new lines of task interdependencies, and extra control over the transactions.

6.3.6 Agreement about SAP_HR implementation and employees' participation in the project

The future users had the possibility of participating in the decision-making process over the choice of the system. Thus, in two faculties, there was a demonstration/evaluation of two systems: PWA and SAP_HR. Both were evaluated as adequate. PWA was already in use in two faculties, and less expensive than SAP, but SAP_HR seemed to have more support on offer from the supplier. From the interviews, we got the impression that full agreement on the system choice was never achieved:

> "I did not like the idea of implementing SAP_HR. I told this to my direct boss. I was even afraid that it would result in an enormous mess in the administrative procedures of the university. I was very open in my opinion and clearly said that I did not like it. But, anyway, the decision was taken to introduce SAP_HR. We had a party with Champagne to celebrate a new era in the salary procedures" (Niels, a former head of the Salary Department, P-14).

After decisions were made and the project scheduled, many of the personnel and salary employees became involved in the detailed preparation to replace the old system.

The working groups that participated in the preparation period, included heads of the HRM departments, administrators, future users, and key-users. The groups received full information about the project during the preparation stage, and had the possibility of giving advice which was taken into consideration and generally applied.

Pilots took place in four units: three HRM units and the Salary Department. The users involved in the piloting had doubts over whether SAP_HR was ready to 'go live', but such opinions were not analysed in depth. The interviewees were convinced that that the pilots had been done too quickly and without thorough evaluations. For example, one of the salary administrators told us:

> "After being involved in the pilot, everyone in the Salary Department said that it was not good. We really did not like the quality when it was prepared for live use. However, unfortunately, nobody from the project management came to us to talk and see how we operated with SAP_HR. In our view, we could have avoided all the troubles if the pilot had been evaluated better" (Nicole, salary administrator, P-12).

During the early months of system use, two groups of users predominantly influenced the SAP_HR implementation. Key-users, during their meetings, raised complaints from the 'regular' users and advised on improvements in implementation. Heads of the P&O departments insisted on radical changes. The heads of the P&O departments had

> "regular meetings once a month. [They] invited the project leader and the head of Salary Administration and talked with them about all the problems. [They] requested the feedback "photos" to compare results from SAP_HR and IPA. Also [they] asked for more qualified employees to be hired for the system administration–both functional and technical" (Sandra, SS_P&O, head of the department, P-16).

We did not find unanimous user agreement on the choice of the system or on the initial decisions made. During the project, the most active user participation involved requirements analysis, the functional and technical designs, and customising SAP_HR to the AcademCentre environment.

6.3.7 The group of SAP_HR users: summary

Summarising this section, we want to emphasise that users of the newly introduced SAP_HR system had to become a group during the implementation process. Beforehand, they hardly communicated at all across the whole group. About 50 employees (personnel and salary administrators) came from different units in the organisation, all with their own internal work traditions, tasks divisions, rules, and responsibilities. P&O and salary administrators had to collaborate because their tasks became much more interdependent than before: the online outputs from the P&O employees were the inputs for the salary administrators. The technology became very standardised and did not accept even minor spelling mistakes in the files.

The system necessitated the re-assignment of their tasks, the development of new lines of task interdependencies, increasing responsibilities and control, and even changes in work cultures. While struggling with the SAP_HR implementation, the users did get familiar with each other, shared problems and difficulties with SAP, and learnt of each other's expertises. We did not find evidence of structural arrangements for team building, only informal communications. Key-users became the expertise centre within the group.

6.4 CHARACTERISTICS OF THE TECHNOLOGY

Now let us take a look at that magic system that brought so much change to the steady working life of the personnel and salary administrators in AcademCentre. In this

section, we will describe the system from the perspective of our theoretical framework. Firstly, we will clarify the intended role of SAP_HR in AcademCentre (Section 6.4.1). Secondly, we shall specify the technical properties of the system (Section 6.4.2), and then we look at the ways and types of collaboration offered by SAP_HR (Section 6.4.3).

6.4.1 The role of SAP_HR in AcademCentre

The document analysis has shown that the main starting point for the organisation deciding to introduce a new personnel system was the necessity to replace an old P&O technology COMI-P because the contract with its supplier was about to expire.

In choosing SAP technology, AcademCentre targeted an additional idea: to match the already implemented Financial Module from SAP® and to standardise the HRM and salary administrative processes in the organisation.

6.4.2 Specification of the system

According to the information available at http://www.sap.com, there are more than 17.000 companies in more than 120 countries that have installed SAP® software.

There are various SAP® technology packages including Business Intelligence, CRM, Enterprise Portal, Financials, Marketplace, and Supplier Relationship Management. The AcademCentre chose one of them, namely *mySAP Human Resources*, that is often referred to as SAP_HR. SAP_HR has four so-called key capabilities: employee life-cycle management, employee relationship management, workforce analysis, and employee transaction management. In this research, we focus only on the employee transaction management component which was selected to manage personnel and salary administration in AcademCentre.

The chosen software packet–SAP_HR/Employee Transaction Management–provides the possibility to process personnel information management and handle reports. There were also choices within this packet, for example, the payroll functionality component was not bought. It means that although using the name SAP_HR, our case study presents results only for one HR packet, and within that only selected modules.

In general, it can be seen as a workflow system. The users have to input the data step-by-step. Sometimes they have to repeat the same inputs; and if they try to 'skip' one step, the system will block further inputs. Screens and information fields "appear" when a user processes administrative tasks. As in many software packages, there are different levels of authorisation allowed within SAP_HR: users who make inputs and may correct them within authorisation (the focus of our study), users who may only read information (for example, HR advisors in the faculties), and system administrators who have the access to all information.

The system was designed to provide technical support for HR and salary administration. From the users' perspective, working with the system involves three types of operation:

- Reading the data
- Making new inputs and modifying existing ones
- Generating and composing HR information reports.

All the information subfields have specific and strict numeric codes. Any misuse might lead to "IPA problems".

6.4.3 Enabling collaboration

SAP_HR in its AcademCentre version is revealed to be a workflow system. It has the characteristics of long-linked groupware and supports sequential interdependence.

All tasks are performed in a set sequence. Personnel administrators input the data into SAP_HR, which allows employees from the Salary Administration Department to process the payment. This means that the Salary Department users only start a transaction on the basis of an input from the personnel administrators. Then the chain progresses to the external system IPA. The personnel administrators' tasks are not interdependent throughout the system: they make transactions in parallel and are only authorised to read the data related to their own departments. However, they have to collaborate in order to operationalise their tasks and processes, and to make correct inputs.

6.5 ADOPTION OF SAP_HR BY THE USERS

We describe the adoption of SAP_HR, by the users, as group learning processes according to our theoretical framework. In doing this, we will portray the processes (collective acting, group reflecting, knowledge disseminating, and sharing understanding) and then grade them according to our operationalisation scheme from "low" to "high".

The results demonstrate that it was possible to distinguish two periods of time in the implementation of SAP_HR: the first 7-8 months that users expressed as a "disaster" (time-1), and later when the situation improved (time-2).

Collective acting

When they began to work with the system, users strived to handle the basic tasks such as inputting personnel data, sick leave administration, time registration, and types of contracts through SAP_HR. They expressed the view that they were afraid at the beginning to work with the system because they could not predict whether transactions would be correct or not. In such cases, they preferred to contact a salary specialist or a key-user and ask them to execute the task.

The users had to operate the system because it was necessary to perform their primary tasks. However, the intensity did differ from unit to unit. For example, based upon the interviewees' estimations, the Salary Department processed about 250 transactions per week, the A_P&O unit about 250 transactions per month, whereas the users from AL_P&O worked no more than two hours per week with SAP_HR.

Initially, the users sensed a lack of time and motivation to search for new options in SAP_HR

but, after six months, the situation changed: they could now work with the system without asking for help every time. They could begin to search for new possibilities in SAP_HR.
There was a special application called "Query" through which a user could generate a range of HR reports. The interviewees emphasised that for them it was interesting to combine HR and financial data. We observed, in various P&O units, initiatives to develop a range of reports such as R&O conversation overviews, summaries about employees leaving the faculties, and sickness overviews.
All the key-users had test versions of SAP_HR, with which they could experiment and search for new possibilities and reports. At the same time, it was commented that those versions did not indicate the connection with IPA that was essential for the work.

Group reflecting

The interviewees expressed the view that initially there was no fruitful communication across the entire group of users. There were opinions expressed that no-one wanted to admit mistakes on their own side and always blamed others, for example:

> "We try to solve many difficulties by phone with the Salary Department, but it is not always easy; our collaboration with the Salary Department could be better. Sometimes they blame us for their mistakes, sometimes the another way around. It irritates a lot, especially when you think you did your job correctly" (Lucie, GS_P&O, key-user, P-4).

> "Sometimes it was not only technical difficulties that caused the problematic situations. Correct and timely communication is very important. Even within those groups closely related to the salary administration we cannot always find consensus: when anything goes wrong, everybody is sure that they did their own job well, and the problem must be elsewhere. Such communication doesn't help to improve the situation, and we might face a similar difficulty in the future" (Daniel, SAP technical administrator, P-22).

Lack of time was considered as the reason for the lack of cross-communication, for example:

> "We did not communicate with the P&Os about the use of the system. We did not even think about that–there were so many mistakes that had to be corrected, it was easier to improve them ourselves instead of talking with the P&Os. It was terrible that we had to correct all the inputs" (Karen, salary administrator, P-13).

However, within the units, there were active discussions about troubles with the SAP_HR administration. In the A_P&O unit, meetings took place once in two weeks, and in SS_P&O every week. The personnel administrator from GS_P&O described it as follows:

> "We worked together (Personnel Department) very well. We discussed difficulties, and helped each other with this system. We made reports about mistakes ourselves, and the key-user took them to the regular meetings. In our faculty, we are lucky to have such a strong team. During all those SAP problems we became even closer to each other" (Tom, GS_P&O, personnel administrator, P-6).

Gradually, after some months of working with SAP_HR, users from different units became more open in the discussions. They expressed enthusiasm for communicating across the entire group at the later phase of SAP_HR use:

> "Also we communicate with other P&Os to ask questions or share the same difficulties. Thus, people from the Service Centre helped us a lot at the beginning. We also liked to discuss SAP with the P&Os from the Social Sciences faculty" (Roy, A_P&O, personnel administrator, P-7).

Key-user meetings became an important source of information exchange. The key-users took the latest news to and from the meetings; and users started sending e-mails across the group with their questions. The meetings of key-users became a strong group device: even non-key-users attended them in order to participate in the communication process. During the interviews all the respondents acknowledged the importance of these meetings:

> "I like communicating with other users. During the key-user meetings we raise a range of questions and exchange our ideas. It is very helpful. Actually I am not the key-user, but I like to attend those meetings (together with the 'real' key-user from our P&O) to gather all the news and to communicate with others. There I always meet the Salary Administration people and talk with them. I also visit them after each meeting–to chat face-to-face. Otherwise we communicate only by telephone" (Marijke, A_P&O, personnel administrator, P-8).

> "Key-user meetings are very good. We talk a lot together and come up with ideas or solutions. It also gives me an impression of the difficulties in other faculties. There is a core group of three persons from three different faculties who raise questions or problems, and at the same time represent the advanced SAP users. It is apparent that if they ask a certain question or insist on a proposal that it should be taken very seriously" (Erik, SS_P&O, key-user, P-9).

> "I try to attend the key-user meetings. They are interesting although many questions are outside my interests: we have neither PhD students nor professors in the laboratory, and therefore the transactions concerning such university employees are not relevant for me" (Monique, AL_P&O, personnel administrator, P-11).

Topics for the discussions varied. For instance, the users recalled the long correspondence and debates about numeric codes in IPA and SAP_HR. We participated in two key-users meetings, where one of the topics was finalising the ten months of discussion about administering parental leave in SAP_HR. To clarify the topic, we asked about it further during one of the interviews. Below is an answer:

> "It started immediately in January 2002. We discovered that the parental leave application process required a different administration of the dates to all the others. Normally in SAP_HR we put the dates like 'from 01 till 31', but the parental leave administration must be 'from 01 to 01'. And it took a long time to find this out: ten months. There were a lot of e-mails, questions, and attempts to solve it. Myself, I decided to wait until the storm was over… They resolved this ten months after the introduction" (Monique, AL_P&O, personnel administrator, P-11).

Declaring one's own difficulties with using SAP_HR was not yet the norm in this group: the users talked about mistakes made by others in the system, and were ready to discuss them, but we did not see anyone admitting individual problems during, for example, key-user meetings. Some of the regular users were reluctant to raise questions as they felt a lack of expertise.

Knowledge disseminating

Demonstrations of operating with the technological options did not take place actively. We found only one example when a user took the initiative to clarify new changes in the CAO à la carte for colleagues and showed how to process changes in ADV hours for PhD students.

Proposing new ideas was not a strong issue within the group, especially at the beginning. The users perceived the system as a 'given' and did not come up with suggestions to improve it. However, during the interviews, we found out that, in the later stages of using the system, the users had many suggestions. They proposed:

- using the numbering scale for employees (to put the names in alphabetical order)
- regular meetings about working with "Query" and possible reports
- generating an error message instead of sending e-mails to each other
- the introduction of a mailing list for all users
- employing strong IT professionals in the project team
- composing a sub-manual about the registration of maternity leave
- special registration of ADV hours
- separate registration of the basic specialisation of employees
- registration of the division of working hours between teaching and researching
- integrating dates about reports on extended sick cases.

These ideas were discussed during the key-user meetings, but only two of them were

implemented–arranging regular meetings about the "Query" module, and writing an additional sub-manual about maternity leave.
The members of the project team commented that they were strictly limited in improving the system within the SAP functionality:

> "It is a standard system. You may make improvements within its functionality. However, if you overrule the system and build additional functions on top of it, you will lose support from the supplier. That's why we have to be careful" (Erika, SAP administrator, P-24).

From the very beginning, users helped each other in working with SAP_HR. If, in the beginning, this took place mostly within the distinct units, already by May 2002 users had 'crossed' the borders and explained their difficulties with the system to their colleagues in other units. For example, an employee from the A_P&O department recalled:

> "When I came to work here, I did not know anybody. In the beginning, I communicated a lot with the Service Centre and the System Administrators. I was very grateful when somebody from the Service Centre came to us to explain SAP_HR and even gave us a list of the names of persons who could help further. To start with, I always used that list to find the right person" (Marijke, A_P&O, personnel administrator, P-8).

After two months of working with the technology, the users wrote additional pieces for the general manual. Thus, an employee from the SC_P&O composed a manual that was different from the official ones: it was based on the administrative tasks rather than on SAP applications. That manual consisted of many tips for the users–all based upon six months of experience. We discovered other 'sub-manuals' written within the units by advanced users: an Excel programme to administer the ADV hours in SC_P&O, instructions for newcomers in the Salary Department, and a sub-manual in the GS_P&O department.

Sharing understanding

All the interviewees were well-informed and understood the goals of the SAP_HR introduction. They mentioned two main objectives in the SAP_HR introduction: replacing an out-dated system, and matching the existing SAP modules in AcademCentre. Those who were involved in the working project groups shared the opinion that by January 2006 IPA would be replaced by SAP_Payroll, and thought that the SAP functionality would then become even more valuable.
We provide two comments from the interviewees showing the clarity of the goals behind SAP_HR:

> "The system was introduced in January 2002 because of two reasons. Firstly, there was already SAP_Financial, and the financial department had worked with SAP for some time. I think, the management desired to have the ICT in the university from a single supplier. Another reason for the SAP_HR introduction was that the contract with COMI-P expired by January 1st 2002" (Roy, A_P&O, personnel administrator, P-7).

> "Earlier we had a system that had become out-dated (COMI-P), it did not respond well to the management programme. It was not very advanced. With the SAP_HR application we got a better link with financial administration (SAP_Financial). Another reason is that IPA will end on January 1st 2006. I think the idea is also to have SAP functionality for the payroll system" (Hans, SC_P&O, head of the department, P-18).

None of the users expressed a need for a new system. On the contrary, they stressed that the previous technology was reliable enough, simple and correct. None of the users felt the need to replace the old technology. An interviewee from the AL_P&O department gave several examples of why she did not need SAP_HR:

> "I think SAP_HR is a good system. You can do many things with it, but I don't need many things. For example, we have our own system for sick leave administration. The same applies to time registration, there is our internal ATREA system. This contains various special items

> such as overworking, working during the weekends or holidays, and evening work. It has existed for ten years already. Maybe it can be incorporated into SAP, I don't know. Therefore, I don't use the sick leave administration and time registration components in SAP_HR. I don't use the "arrangements" application. They do this in the R&O files and keep them on paper. In SAP, this would be extra work for me. Other examples of useless applications are the "previous employer" field, and the "children" and "subscriptions" fields. I don't need them" (Monique, AL_P&O, personnel administrator, P-11).

During the first six months, the users felt that they did not really understand how to operate SAP_HR. All 24 interviewees commented that they lacked an understanding of the logic of the system. For example, a salary administrator said:

> "It was terrible that we had to correct inputs, and we did not have enough knowledge about the system and how to work with it. We did not even have an image of a good input, and how a correct input should look. It was very confusing for us because one month an input "A" was good and accepted by the IPA system, but the next month the same input "A" was certified as bad and rejected by the same IPA. It was not clear what was behind the screen" (Karen, salary administrator, P-13).

The main complaints were about the lack of understanding of what was "behind the screen". It was not difficult to click the buttons, but they needed to foresee the outputs of the transactions: the connection with IPA which, at the beginning, seemed to be a big black box.
In line with some opinions, the situation at the beginning could be characterised as a high uncertainty–most mistakes and their understanding came from experience, they could not be predicted in advance:

> "The situation at the beginning could, in general, be characterised as one of high uncertainty–COMI-P was very quickly replaced with SAP_HR. We got a new system, and we did not know sufficiently what to do. The biggest problem, and the highest priority, was to keep to the deadlines for all transactions" (Sandra, SS_P&O, head of the department, P-16).

> "In fact, none of the project leaders realised that we–the P&Os–did not know about IPA. We had never worked with it. The end-users in their day-to-day work see only SAP screens. We were confused a lot because sometimes SAP_HR allowed us to input a number (as a code), but it was then forbidden by IPA, etc." (Lucie, GS_P&O, key-user, P-4).

> "Most of the mistakes are only recognised after an employee complains. We don't know about them "in advance". People inform us about mistakes in the personnel documents or in the salary administration" (Hans, A_P&O, head of the department, P-18).

It took the users, as we mentioned earlier, 6-8 months before their understanding of working with the technology improved:

> "It became easier only after I understood the ideas behind it. I think this occurred sometime in August 2002. In fact, it is not difficult to click the buttons, but that came later. Honestly, I am still not enthusiastic about SAP_HR. Of course, I hope that one day it will be fine" (Betsy, SS_P&O, personnel administrator, P-10).

In discussing the users' attitudes towards the functionality of the system, we should note that most opinions were negative. Criticisms concerned both technical and contextual aspects of SAP_HR. We have summarised the following points of criticism that arose during the interviews:

- making mistakes was "blind": a user could not understand why an input was wrong
- some mistakes were too difficult to solve
- classification of the employees in the system was too complex
- searching for new possibilities was limited as the system was very standardised
- making historical overviews was impossible
- the system did not seem to be logical (for example, the dates in the contracts are notified as "van…tot", but in reality you should transact as "van…t/m")
- the codes in SAP_HR were different from the codes in IPA and therefore there was a

need to memorise them
- useless functionalities (such as educational data on the employees, data about children– which was not processed in calculating salary)
- some issues typical of a university environment were not incorporated in SAP_HR (conference leave, sabbatical leave, CAO).

One of the personnel administrators described her attitudes towards SAP_HR as follows:

> "In April 2002 I started to hate the system and working with it. I had a feeling that everything I did went wrong, and that it was all about salaries and bonuses" (Monique, AL_P&O, personnel administrator, P-11).

At the same time, the functional and technical administrators of the system were of the opinion that SAP_HR was very logical, technically reliable, and easy to use.

Mutual adjustment

Arranging activities to improve the use of the system became observable after several months of experience. In the beginning, activities–if any–were initiated by the project team and not by the users. Since spring 2002, as the interviewees themselves noted, they have tried to initiate actions besides key-user meetings. Thus, informal discussions over a "cup of tea" were arranged by the SS_P&O together with the Salary Department. Additional discussions about certain transactions were also initiated outside of official meetings (for example, the development of the report for the Executive Board).

We have discovered a diversity of regulations developed by the users in different units:
- control over transactions was organised in different ways: from triple control with the involvement of the head of the P&O, to double control by the same user in AL_P&O;
- in GS_P&O, there was an agreement that the key-user decided whether to inform regular users about e-mails from the project team or not–in order not to 'overload' them;
- each P&O had its own time schedule within the faculty for making changes in personnel files; and they agreed a schedule with the Salary Department for providing them with the data that would guarantee salary payments;
- in January/February 2003 (a year after the system introduction)] the Salary Department introduced 'report forms' for those P&Os who had questions in order to initiate discussions instead of automatically correcting the mistakes themselves.

All the interviewees noted that there were no evaluation rounds in the project. Here are some comments:

> "We did not have any evaluation concerning the project, nor about the course, nor about the managing of the project, nor about collaboration. Nobody from the project team visited us, we are far from the other faculties" (Marijke, A_P&O, personnel administrator, P-8).

> "As far as I can remember we never had any evaluation rounds or sessions during the key-user meetings. We did not have time for that. Me, myself, I just wanted to keep my head above water" (Erik, SS_P&O, key-user, P-9).

> "We expected evaluation sessions from the consultancy firm, but this did not happen as we wanted. They took complaints personally instead of being oriented towards improving the system" (Monique, AL_P&O, personnel administrator, P-11).

> "There was no comments, nor any systematic evaluation of the transactions made in SAP_HR in order to learn and improve the work. For the first half year it was terrible" (Sandra, SS_P&O, head of the department, P-16).

6.5.1 Group processes: summary

We saw that group learning within the SAP_HR users group had developed from a low level at the beginning to moderate after eight months of using the system. This development went slowly and caused difficulties for the users.

Collective acting developed from being afraid to click the buttons at the beginning to attempts to generate various HR reports. The key-users remained the most active, but the rest of the group also reached a more active stage. Routine administrative tasks became easier to execute for everybody. Group reflecting among the targeted employees also developed progressively. In the beginning, discussions about SAP_HR implementation took place only at the micro-level, i.e. within the units, and there were no fruitful communications even between Salary Administration and P&O departments; later it developed into e-mail, telephone, and other informal ways of corresponding and discussing SAP_HR across the units. The key-user meetings became especially popular.

Proposing new ideas for SAP_HR improvements was not a strong issue within the group. During the interviews, we heard suggestions from the users that we could divide in two categories: improving technical issues, and social issues with the implementation process. Clarifying difficulties at the beginning took place mostly at the micro-level, while later it developed into actively helping each other across the group. The general understanding of the purpose of the system coincided with the reality. All the users were informed about the goals of SAP_HR and expressed them correctly. However, we did not find expressions of the users' needs in SAP_HR, even during the later stages of working with it. Operating the system was very difficult at the beginning, and the users could not grasp its functionality. Later, it did become easier but there were still misunderstandings over exceptional operations. Users' attitudes towards the functionality did not improve during the observed period and remained negative. Only key-users appreciated the possibilities of generating reports. We did not discover any activities arranged by the users in order to improve their work with SAP_HR, in fact, there were only two informal meetings and these were initiated by the SS_P&O department. Most regulations were developed at the micro-level in the units (such as rules to control the inputs or processing CAO à la carte). There were no evaluation rounds concerning the system, the project, or cooperation.

We placed qualitative labels on the group learning processes among the SAP_HR users twice: at the beginning of the implementation, and after 7-8 months. In this way, the following improvements in the processes were identified:

- Collective acting–from moderate to active
- Group reflecting–from weak to moderately strong
- Knowledge disseminating–from fuzzy to moderately intensive
- Sharing understanding–from low to moderate
- Mutual adjustment –from weak to mostly weak.

All the processes had thus developed in a positive direction. The users understood the intentions of the system. However, they perceived it as useless, and they did not feel there had been an immediate need for a technological change in their tasks. Immediately after the introduction of SAP_HR, they faced enormous difficulties in

operating the technology and could not understand the reasons for such difficulties. Their discussions within the P&O units strengthened their negative perceptions of SAP_HR and convinced them of its job *non-relevance*. However, in contrast to our second case study, the users had to persevere with the technology. A slow development of interactions across the P&O and Salary Departments gradually involved all the users in discussing the system and helping each other. The exchange of experiences through key-user meetings, e-mail and telephone conversations, and also informal "tea" talks, slowly but surely improved the understanding of the system and its relevance for the job tasks. This led to the actions, the improved use of the technology by the group.

The next section looks at the managerial practices that were undertaken to keep the implementation running.

6.6 MANAGERIAL SUPPORT

We continue with our understanding of the SAP_HR implementation by looking at the support given to the end-users by the managers responsible for SAP_HR implementation. We shall follow the operationalisation scheme and look at the managerial support from five perspectives: authority and responsibility given to the employees in their use of SAP_HR; availability of different learning opportunities; the level to which use of SAP_HR was recognised and rewarded; willingness of the managers to support the end-users; and time allocated to exercise with the system.

Autonomy and responsibility

The interviewees emphasised that they did not think about their own responsibilities in decision-making in this project. We discovered three situations that showed such possibilities. Two units–SS_P&O and GS_P&O–changed their working schedules during the early months: their access hours for faculty employees were restricted, for the rest of the time they were busy with SAP_HR. In AL_P&O they decided to hand over all control responsibilities to one user (instead of sharing it with, for example, the head of P&O). In SS_P&O a new employee from the consultancy firm "A" was hired to improve the situation surrounding SAP_HR. The interviewees described it as follows:

> "We decided to close our P&O department for three days in order to check all the paper files and find the mistakes in SAP_HR. We manually compared the paper- and SAP- based personnel data for all employees in the faculty, and found lots of errors in SAP" (Tom, GS_P&O, personnel administrator, P-6).
>
> "The employees of our faculty were angry–we promised each time to solve their salary problems. We decided to change the working schedule: the department was only open for questions from 10.00 till 12.00. The rest of the day we were busy with SAP_HR. This lasted for some months" (Erik, SS_P&O, key-users, P-9).
>
> "In our department we took the decision that I would control all the inputs. I discussed it with my boss and the System Administrators. We agreed that after the initial inputs, I would print it out, show it to the boss, and describe what was done. After that I use a different password to make the controls" (Monique, AL_P&O, personnel administrator, P-11).

All the users had freedom in their use of SAP_HR. They could plan their work themselves, they were free in dividing up their tasks in working with SAP_HR. Many of them confirmed

that they were

> "… completely free in work with SAP. [They] were not limited or controlled concerning [their] priorities on how to work or who was doing the transactions. [They] had freedom to create [their] own style of working" (Marijke, A_P&O, personnel administrator, P-8).

This freedom had one limitation–the users could not go back to the old ways of administration: the use of SAP_HR was strictly obligatory. To our question, as to whether it was possible to turn back to the old technology, an interviewee responded:

> "All the changes and demands came so rapidly that we did not even think to keep the old way of working and send information on paper to the Salary Department. First of all, it would mean more work for the Salary Department and, I think, neither the steering committee, nor the consultancy firm, would accept that. By the way, once such a question was raised–would it be better to go back to the old paper interface–but we did not even elaborate on it" (Lucie, GS_P&O, key-user, P-4).

Promoting different learning opportunities

Before SAP_HR was introduced, there was a course about the system, provided by the consultants. Interviewees were all of the opinion that this was not sufficient and did not give any idea about using SAP_HR. They recalled that they were instructed only how to click the buttons, but lacked knowledge about the main principles of SAP, its connection with IPA, and the outcomes of incorrect inputs. In some situations, during the course, there was only one PC available for three learners. The content of the instructions seemed to be far from the reality:

> "During the first day of the course they explained to us how to click the buttons but it was too simplistic. The second day was a bit better–about the administration of basic employee appointments. But, in reality, all the appointments include so many special details and different personal situations that when I came to do the work, I felt lost with my limited knowledge from the course" (Marijke, A_P&O, personnel administrator, P-8).

> "We had a training course on how to use SAP_HR, but it was not enough. It was too short and mostly related to the technical characteristics of the system, while we needed explanations about what to fill in, why, and when. Immediately after this, we had to work with the full responsibility of the new system" (Roy, A_P&O, personnel administrator, P-7).

> "The training course was too complex for us. It was quick but not efficient. I did not have a clue about how to make inputs, or where, or why. We did not practice with the system. They decided to introduce it and let us learn from the experience. But, in such a case, you need highly qualified teachers. In my view, the reality was far from this" (Erik, SS_P&O, key-user, P-9).

The course was not oriented towards the specific individual situations of the end-users, but had a general content. A personnel administrator from the AL_P&O emphasised that:

> "They gave training about SAP use. I cannot say that it was a very fruitful session. We, the users, are very different. For those who work eight hours a day with SAP there was a need for advanced skills and knowledge. But I only work with the system for two hours per week, not more. It makes things different! My questions may seem quite basic for the advanced users but I am not a computer person at all" (Monique, AL_P&O, personnel administrator, P-11).

We did not discover any special on-going education, or courses, for new employees. We did not find any arrangements or agreements about instructing new users in SAP_HR: those who joined after the introduction of the system had to learn it from the own on-the-job experiences.

There were lots of manuals and 'sub-manuals' about operating SAP_HR. The interviewees

stated that these were not helpful: they were too long. Nobody could find time during their usual working days to study these SAP_HR "encyclopaedias". The first "good" manual was released on CD in July 2002 (half a year after SAP_HR's introduction), and the best in February 2003 (a year after the introduction). Both manuals were the joint product of the salary and personnel departments.

Our document analysis has shown that there were about 40 manuals and sub-manuals. In some units employees developed internal instructions. The users also got 2-5 e-mails each week from the system administrators–small changes to the main manual. Some users printed them out and put them on their whiteboard and tried to memorise the contents, others ignored these notes relying on the expertise of key-users.

Everybody was welcome to attend key-user meetings and discuss all the questions. The help-desk also provided an opportunity to raise any questions. However, to some users, the help-desk service looked like a black box: having sent an e-mail, they did not know when to expect an answer. Each key-user had a test version of SAP_HR and could experiment with different technological options. However, the test versions could not validate the connection with IPA. Since June 2002, the help-desk introduced the possibility of making so-called "photos": copies of the files transported to IPA. This provided the opportunity to learn from comparing transactions in AcademCentre with outputs in IPA.

Feedback

We did not discover any policies or arrangements for recognising progress in the use of the system. Only the aforementioned "photos" gave a structural, programmed feedback to the inputs. In all units, during the departmental meetings, they discussed "bad" cases in the use of SAP_HR–i.e. when employees did not get their salaries.

Reward schemes did not exist. In the units, the heads of the departments, on their own initiative, financially rewarded users for their troubles with SAP_HR. However, we did not discover initiatives to reward the users from the project team, or from 'top' managers. Here are some of the users'comments:

> "We never got any feedback from the SAP_HR project team–no encouraging comments, enthusiastic letters, or feedback notes during key-user meetings. No financial support for our troubles. But our direct boss, the head of the P&O department in the faculty, paid us special bonuses to compensate for our hard work with SAP" (Lucie, GS_P&O, P-4).

> "When I had troubles at the beginning, my direct boss really supported me. I even got €1000 gratuity for these troubles, but not from the management team" (Monique, AL_P&O, personnel administrator, P-11).

Management style

The interviewees expressed the view that communication with the management of the project had to be improved.

> "At the beginning I was very frustrated–you complain 4-5 times about the same problem, and you don't see anybody working on it… Maybe they were, but without telling us. Anyway, communication has to be improved. I felt that if, following my request, the System Administrators went to the consultants, that the situation became blocked with an unclear future" (Monique, AL_P&O, personnel administrator, P-11).

Sometimes they had to wait a long time to get an answer to a seemingly simple question. In such situations, some users preferred to call and ask a colleague from another unit than somebody from the project team. The users even questioned the level of professional qualifications of the functional administrative team of the system.

At the same time, during interviews, the system administrators expressed their willingness

to help and their disappointment about difficulties in collaborating between different units in the project:

> "Sometimes we face difficulties related to communication between different [units] in the organisation. Sometimes I feel that nothing goes smoothly, nobody is ready to take the final responsibility. As a result, documents or deliverables are delayed. The question of responsibilities becomes a grey area" (Erika, SAP_HR functional administrator, P-24).

During the interviews, the end-users complained that their ideas were not always taken into consideration during the project:

- right from the beginning, the project team and faculty directors did not support the choice of SAP_HR:

> "We decided to change the system. The faculties supported PWA rather than SAP, but the decision was for the SAP application" (Niels, salary administrator, P-14).

- instead of piloting the system among very experienced users, the employees suggested piloting it among future users who had never worked with IPA:

> "In November 2001 I did the pilot. It was not difficult for me as I had experience of working with IPA. It was not the best idea to ask our department to pilot the system. I think it would have been better, and more useful, to ask people who were not experienced with IPA to do the pilot. I told all this to the System Administrators and the project team, but probably they did not listen. The results would then have been more reliable and valuable for the project implementation" (Vivienne, SC_P&O, personnel administrator, P-2).

- in the AL_P&O, the personnel administrator prepared new files for the conversion, but the conversion was done using old data:

> "In November 2001 there was a pilot in the P&O of the Pharmacy Faculty, and I heard from their key-user about many difficulties with converting the data. That's why I really did my best to correct mistakes in the existing version and to prepare it for the conversion. I had to do this alone as the only P&O worker in the laboratory, and that made me feel even more responsible for the situation. But they took the old version with all the mistakes for the conversion, and I was very disappointed about that. Days of work–for nothing. It was far from what I expected!" (Monique, AL_P&O, personnel administrator, P-11).

There were also no negotiations with the users about their expectations from the system, and about their proposals. In December 2002, a new member, who had experience in SAP implementation, joined the SAP_HR functional administration. Since then–according to the users' opinions–conversations with the project team have become more open and 'user-centred'.

Time

There was no specific time allocated to practice and experimentation with the system. Many interviewees noted the high time pressure during the first half year. They did not get time to learn and practice with SAP_HR, as all their usual tasks remained.
It seemed that the managers, and the functional and technical administrators of SAP_HR, also did not have time allocated for the users to discuss implementation issues.

> "At the beginning I tried to practice with the system, but there was nobody around to whom I could ask a question and get fruitful help. In fact, it was even impossible to practice! I felt that I was cut off from my work–I was blocked" (Betsy, SS_P&O, P-10).

6.6.1 Managerial support: summary

In our view, the managerial support provided to the end-users was not adequate at the beginning, but had improved after 6-8 months.

The main approach to the SAP_HR implementation can be characterised as 'top-down'. The users were free in their plans and styles in operating the system, but very limited in their choices and decisions. The main issue was that the technology was strictly obligatory. Learning opportunities were incomplete. Training sessions were far from the reality of the personnel and salary tasks, and mostly oriented towards technological functionalities. Lack of clarity and uncertainty about the use of the system forced the users to design their own manuals, sub-manuals, and short e-mail instructions. The project team was not sure whether employees used the general manuals.

However, after 6-8 months, additional learning possibilities were introduced for the users that expanded interactional processes and exchange of experiences among them: a help-desk service, test versions of SAP_HR, and long awaited "photos" from IPA as feedback pictures. Later, in February 2003, a complete CD-based manual was released.

The feedback given to the users by the project steering group could be characterised as having an absence of any recognition of users' efforts. Only awards from users' immediate supervisors contributed to the project reward atmosphere. All parties involved complained about the lack of communication. Every person and every managerial unit seemed willing to cooperate with the end-users. In practice, however, the intentions were lost between these units. As a result, end-users felt helpless, especially at the beginning. Many of the users' suggestions were ignored. This situation occurred from the very beginning: most of the users who took part in the pilot suggested extending it as they did not feel ready for 'live' implementation.

Based on the descriptions above, we have given the following qualitative labels to the managerial support in the SAP_HR project:

- Autonomy and responsibility–moderate
- Promoting different learning opportunities–moderate
- Feedback–weak
- Management style–moderate
- Time–insufficient.

To sum up: although the managerial support dimensions were estimated as moderate to low, managerial support did develop over the project's trajectory and was better 6-8 months after the system introduction. The users acquired an adequate manual, computerised feedback from IPA, help-desk facilities, key-user meetings, and a new SAP professional.

6.7 SUCCESS OF THE SAP_HR IMPLEMENTATION

We have shown that the group of SAP_HR users contained structural and non-structural diversity because the members came from different sub-groups, we have also demonstrated how difficult the technological features of SAP_HR were for the users to begin operating with. We have seen that the group learning processes developed slowly. Now let us describe the results of the SAP_HR implementation. To do that we talk about efficiency of the project in terms of time and the number of employees who got used to the system, and we will look at how skilfully and task-consistently the users operated the system.

6.7.1 Efficiency

According to the project schedule for SAP_HR implementation, in March-April 2002 (3-4 months after the introduction) evaluation rounds were planned among all the units involved to assess the success of the implemented system. However, until August-September 2002 all the users were continuing to experience problems in trying to get used to the system. They did not have a choice to avoid or cease working with SAP_HR, and thus continued to develop their own experiences. Two users moved to other work places (without SAP_HR). Instead of a 3-4 months brave march to full SAP_HR operation, users faced seemingly endless difficulties and darkness in working with it. Eventually, a year after the introduction–when even the project leader had lost his enthusiasm–the users did begin to feel more comfortable with SAP_HR.

6.7.2 Stable use

We provide data on the stable use of SAP_HR for the time when the employees had been using it for 7-8 months. A description of the qualitative data (interview, field notes, and observations) concerning stable use of SAP_HR is presented below.

Ease-of-use

The interviewees emphasised that operating the system was not easy and slowed their speed of working:

Personnel numbers were linked with the family names that were, in turn, placed in alphabetical order and

> "if you wanted to search for a name in the system, the system gave you hundreds of people with the same names with a rather complex classification, you have to spend quite some time to find the right person" (Vivienne, SC_P&O, personnel administrator, P-2).

Correcting mistakes took a lot of effort. The salary administrators told us a story about changes in the salary savings scheme for the employees in AcademCentre that they had to process due to government policy. They tried to input all the changes at once for all employees but the system collapsed and they had to begin from the beginning and do it for one employee at a time. Spelling mistakes were difficult to discover and even more difficult to resolve:

> "In fact, since the introduction of the system we started getting more and more mistakes in the database. The SAP application didn't allow you go further unless you left the existing mistakes" (Hans, SC_P&O, head of the department, P-18).

Sick leave administration required processing the same transactions in several sub-fields and all appointments of an employee required additional time:

> "I would like to work out the information about one person only once without wasting time on the same administration steps several times!" (Betsy, SS_P&O, personnel administrator, P-10).

> "… If a person stopped working, I had to go through all his/her information fields to cancel them: salary, using the train card, and CAO à la carte. It didn't block them all automatically" (Monique, AL_P&O, personnel administrator, P-11).

All the interviewees shared the belief that SAP_HR was too difficult to operate, mostly because the principles of the system were not clear. Especially the information management tool "Query" seemed to be complex.

Task-system fit

The users noted that not all the personnel administration tasks could be performed using SAP_HR. Thus, the following tasks were excluded from the system responsibility:

- communication with employees (on-line, sending documents)
- conference leave processing
- calculating ADV hours (currently this is processed separately)
- CAO à la carte was only partly in the system.

At the same time, some options in the system were perceived as useless: registration of the train card details, subscriptions, and full information about children of the AcademCentre employees.

Many interviewees shared the opinion that the system did not improve their task performance.

> "I cannot say that there were advantages in the task performance. It was not better, not quicker, not nicer…" (Niels, salary administrator, P-14).

> "I think the results of using SAP_HR were not that enthusiastic. We didn't perform quicker or better. In my view, we even started providing fewer reports than before. For example, earlier I could give the management prognoses about financial costs until the end of the year (with COMI-P). But now I am not doing that" (Sandra, SS_P&O, head of the department, P-16).

The users doubted the reliability of the information in SAP_HR. For example, a year after the introduction, a user

> "discovered a very big mistake. If a person worked for the company in different departments (part-time), he/she got double all premiums: personnel administrators made inputs independently, and the system thus doubled the amount. It was difficult to estimate the financial losses of this situation over the whole year" (Vivienne, SC_P&O, personnel administrator, P-2).

The interviewees gave us other examples of when they discovered mistakes in the output reports from SAP_HR such as wrong totals of sick employees or new workers. This made them question the quality and reliability of the output information in general.

Talking about their usual "pre-SAP" way of administering HR, the employees emphasised the mismatch between their traditional way of working and the "post-SAP" situation:

- CAO à la carte was executed partly in SAP_HR, partly in another IT, and partly manually.

- Administration of declarants required special tricks:

  > "You register him/her on date 'A', however we cannot pay the salary from that day but only from later. You have to do special tricks in the system in order to get the salary on time" (Lucie, GS_P&O, key-user, P-4).

- The system did not recognise the difference between two types of professors, and that again required adaptation of the system from the users.
- Almost every week the system administrators would send e-mails to all the users detailing the discovered small tricks–such as how to handle SAP_HR and IPA. Some of the users didn't read them (relying on the key-users), some printed all the notes and put them on their whiteboards and tried to memorise the latest news.
- The system could not cope with transactions if they were input immediately one after another. The users usually had an additional schedule for 'on-going' transactions.
- All transactions that were sent to the Salary Department were held for about two weeks. During that time, any personnel administrative processes concerning an 'unlucky' employee were blocked in the system.
- If an employee had multiple appointments (part-time) or 'jumped' from one unit to another (on a project basis, for example) then, each time, the system created a new personnel number for that employee. As a result, a SAP_HR user could be faced with the same employee name ten times over without knowing 'which one' was really active.
- The AL_P&O had their own IT for sick leave administration that required working with two different systems.
- The codes for salary administration in SAP_HR and in IPA were different, and this again called for adaptation.

According to the heads of the P&O departments, one result of the introduction of the system was damage to the image of the HRM departments in the units:

> "The most awful result, in my view, was that during the first months of struggling with the system, the HRM department lost its good image in the faculty. All the credit that we had built up through our good work for the employees was lost. We were already trying to achieve the grander HRM goals such as improving situations in different departments and social issues. We achieved this from a stable base: good and reliable administration of the personnel data and salaries. It was a very pitiful situation, having attained a higher level, to find the basis–the salary administration–destroyed and the rest becoming irrelevant …" (Andre, head of the A_P&O, P-15).

6.7.3 Implementation success: a summary

SAP_HR was expected to be easy-to-use. However, the analysis of the interviews has shown the opposite. The system was difficult to understand, to work with, and to learn new applications. In the perceptions of the users, it demanded a lot of effort from them to make transactions: some inputs had to be repeated, some modified, mistakes were hard to spot, and the logic of working with the system was not clear, especially its linkage with IPA.

The targeted employees believed that using the system did not help them to execute or improve their task performance. Some functionalities in SAP_HR were considered as useless (train cards details, information about the children of employees, library subscriptions), other important ones were lacking (CAO à la carte, conference leave processing, calculating ADV hours).

Further, the HRM administration logic did not match the SAP_HR logic: the users had to change their way of submitting and processing the documents, the numeric codes for inputs in SAP_HR and in IPA were not identical, SAP_HR did not accept inputs made immediately one after another, transactions were blocked for two weeks after a single input in SAP_HR, and multiple appointments for an individual employee had to be input under different personnel numbers. The confusing outcome damaged the image of the personnel specialists in the faculties.

We also talked with the technical administrator of the system. Their explanation clarified some issues:

> "SAP was primarily designed for industrial companies, not for universities. For industry, everything is developed very well in SAP. But in the university you have another work situation, for example, several appointments for one employee, which is not the case in companies. This created difficulties for the personnel administrators. Another example: in the financial part of SAP there is a market option which, in fact, is useless for the university" (Daniel, SA_HR technical administrator).

6.8 ANALYSIS OF THE ACADEMCENTRE CASE STUDY

6.8.1 Trustworthiness of the case study

Before summarising the specific findings for this case study, we will turn attention to the trustworthiness factors contributing to the reliability of the gathered information and conclusions (Lincoln and Guba, 1985).
We used the same tactics as in the previous two cases in order to ensure the quality of the data and information collected:

- prolonged engagement (Gardner, 1993),
- persistent observation (Tashakkori and Teddlie, 1998), and member check (Lincoln and Guba, 1985).

We spent half a year with the group of users in AcademCentre to become aware of the 'contextual' factors and the multiple perspectives of informants. We became familiar with the work traditions and rules. We observed the group mostly during formal work situations. Besides scheduled interviews, we took part in the key-user meetings. Participating in such activities allowed us to get to know the group better. Transcripts were discussed with the respondents in order to verify our interpretations of the interviews. We also discussed with the project team and the project manager our interpretations of the findings. The final report of this case study was discussed with the project leaders.

The quality of the findings and conclusions is enhanced because:

- *Use of triangulation techniques*. In following the same case protocol, we used the same research methods as in the Medinet and InsurOrg case studies. We used qualitative methods (interviews, observations and document analysis).

- *Discussions of the results*. We discussed the on-going results with the project team. The complete version of the case analysis was presented and discussed with the manager and the project leader.

6.8.2 Discussion

We started the third case study with the knowledge that SAP_HR implementation had developed with many problems in AcademCentre. The users struggled with the problems in SAP_HR for 6-8 months until working with the technology became easier although still not fully enjoyable. After 6-8 months, the employees were wiling to cooperate with each other in order to develop their work with the technology.

How does our theoretical framework help to understand what happened in the AcademCentre in the implementation of SAP_HR?

After a period of eight months of preparation, the technology was introduced to the users on January 1st 2002. Although the users received instructions and participated in the workshops to convert and set up the introduction of SAP_HR, they found that they were not ready to operate the system but did not have the option to reject it.

The introduction of the system was initiated and promoted by the top management in AcademCentre, and the choice of the technology was never fully supported by the future users. SAP_HR use became obligatory with the purpose of replacing the outdated COMI-P system and standardising HRM and salary administration in the organisation. In traditional terminology, SAP_HR could be labelled as representative of ERP systems.

What did the users experience and feel after SAP_HR was introduced to them? Personnel administrators saw significant changes in their daily tasks: greater responsibilities for making on-line inputs, more control over those inputs, the necessity to be interdependent with the salary administrators, and a need to collaborate with other personnel administrators whom they did not previously know. Salary administrators also got new tasks–to control the inputs from the P&O departments, the necessity to collaborate with them, and to learn how to operate SAP_HR. An additional issue complicated the work with SAP_HR: the interface with the external salary system IPA often obscured the inputs in SAP_HR.

Stress, greater responsibilities, and uncertainty in making inputs brought about by SAP_HR stimulated negative interpretative schemes about the technology among the users. They did not want to invest a lot of effort and were disappointed by the technology.

Right from the beginning, the users perceived the system to be not worth learning and worse than the previous technology. The negative opinions about SAP_HR increased every day as the users collected and accumulated disappointments, including small details and misunderstandings with the project team.

How was the group of users prepared for the introduction of the new system? The post-SAP group of users had about 50 members, distributed in various locations in the AcademCentre. Within this emerging group, there was a great diversity of job tasks,

rooted in differences in faculties' traditions, tasks divisions, and rules. Before SAP_HR introduction, the users did not communicate much, and only knew each other to a very limited extent. We did not find evidence of such structural arrangements as group leaders or group meetings. However, a sub-group of 5-6 key-users did emerge as an influential unit in the group building. While a pre-SAP group did not exist as such, the key-users contributed to post-SAP team building: they held regular meetings which all the users could attend, they took the initiative for informal meetings with different departments, and they communicated with the project team on behalf of the users.

All the users had sufficient software skills because they had all worked with HRM information technology before SAP_HR, and some of the users had advanced software skills. However, as in the previous case studies, we did not observe a strong relationship between software skills and the use of SAP_HR.

Neither did we see strong user participation in the project. Only key-users actively took part in the preparation and conversion of the system, and in working workshops. A pilot for the system took place in four units in the AcademCentre, but the users did not agree with the official positive evaluation of this. However, their opinions were not taken seriously.

The issues described–a given technology, group/task characteristics, software skills, and user participation–were settled at the moment that SAP_HR was introduced. What did we observe further? We saw that the meaning assigned to the technology by the users after the system went live continued to develop. The group deepened its negative impression and collected pessimistic stories about SAP_HR.

Although a negative opinion about SAP_HR grew within the group, the system remained obligatory in use: the users had to work with the given technology. Slowly, after 6-8 months, the interpretations of SAP_HR began to move in a positive direction. The employees started finding ways to avoid major problems with SAP_HR.

To estimate group learning we use qualitative labels ranging from 'low' to 'high' (i.e. active-passive, high-low, intensive-fuzzy). Using such labels we keep to our operationalisation scheme, where 'high' learning reflects the intensity of the users' activities and orientation towards improving system adoption.

The qualitative analysis of the interviews and documents allowed us to distinguish and rank every learning process twice: at the beginning of the SAP_HR implementation and after 6-8 months:

	SAP_HR users–group learning in January 2002	SAP_HR users–group learning in August 2002
Collective acting	Moderate	High
Group reflecting	Low	Moderately high
Knowledge disseminating	Low	Moderately high
Sharing understanding	Low	Moderate
Mutual adjustment	Low	Mostly low

All the five group learning processes progressed in a positive direction over time. Mutual adjustment processes progressed the most slowly. The users became more active in discussing difficulties in IT implementation and helping each other. The employees started actively operating with the system every day. Our analysis has shown that the users acknowledged that they did not need SAP_HR, although they understood the overall goal of the system in AcademCentre. They shared opinions about the worthlessness of SAP_HR, and maintained negative attitudes about it functionality. Gradually, they came to see some advantages of the system such as the possibility to generate reports and manage information.

The AcademCentre case study has provided new insights into the understanding of IT implementation. We found that, at the beginning of the project, the group learning processes had mainly occurred at the micro-level–in the units. Further, the interaction processes across the entire group of users were at a very low level during the first months of implementation. We explain this by the initial lack of structural and non-structural features of the group of users.

The SAP_HR users shared pessimistic attitudes towards the system. Even after eight months of using SAP_HR, they still perceived it as difficult to understand, to work with, and to learn new applications. Mistakes were difficult to find and correct in the system, its logic was not clear, especially its connection with IPA. Some functionality in SAP_HR was considered as useless (e.g. train card details, information about employees' children), while other important topics were lacking (CAO à la carte, conference leave processing, calculating ADV hours). Other complaints about the system included the numeric codes for inputs in SAP_HR and in IPA not being identical, SAP_HR not accepting inputs made immediately one after another, transactions being blocked for two weeks after a single input in SAP_HR, and multiple appointments for the same employee having to be input under different personnel numbers.

In discussing managerial support for the SAP_HR users, we should note that this evolved over time. The SAP_HR implementation can be characterised as a 'top-down' approach. The users were limited in their choices and decisions. Training sessions at the beginning of the implementation and manuals were far from the users' real needs, and mostly oriented towards technological functionalities. However, after six months, the users got more useful support such as a help-desk service, test versions of SAP_HR, and long awaited "photos" from IPA as feedback. Later, in February 2003, a complete CD-based manual was released. A new IT professional, specialised in SAP implementation, joined the project at a late stage, and brought a fresh cooperative approach to communication with the users. Key-users meetings became open to all the users.

Having discussed our observations in the AcademCentre case study, we will now reflect on the research model. As in two previous case studies, we believe that reflecting on the research model can help to crystallise the conclusions.

6.8.3 Analysis of the constructs in the research model

Following the same case study protocol as before, we will use the same analytical procedure as in the previous two cases. In this section, we review the relevancy of the components for the constructs of group learning, managerial support, and stable use. After a brief reminder of how the analysis is performed (this is elaborated in the Methodology chapter), the results are presented for each dimension.

To estimate the significance of the components (in the group learning, managerial support, and stable use constructs) we have combined two perspectives: firstly, the research value of the sets of texts (discourses) from the interviews transcripts, ranked from "low" to "high"; and secondly, the linguistic and contextual features of those text units which can sometimes bring additional nuances to the components.

As in the other two cases, we have viewed every component from four angles:

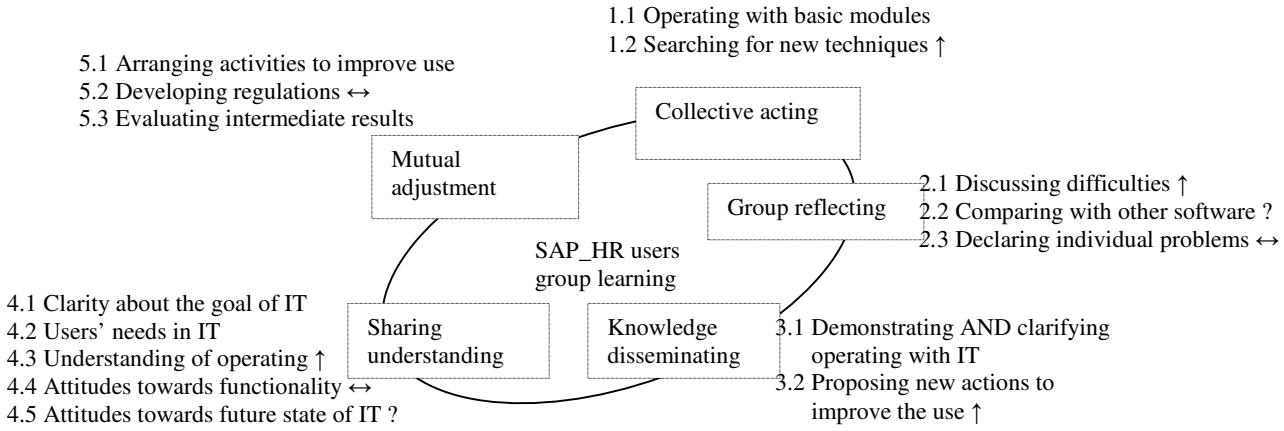
- The total number of analysed text units that represent a certain component.
- The qualitative ranks that were applied in the descriptive part of the case study: strong, moderately strong, moderate, mostly weak, weak.
- The linguistic features of each text unit in terms of their significance for a specific component (revealing vagueness or clarity of the statements through looking for generalising references, metaphorical expressions, use of jargon, stressing hidden meaning, text coherence, rhetorical questions, and doubts as against black-and-white images).
- Where applicable–the historical and contextual characteristics that contributed to the evaluation of the component and the dimension as a whole.

Such a sophisticated analysis allows one to refine the components in the research model. We observed that:

- Some components in the group learning, managerial support, and stable use constructs can be retained in the model without any changes as they continued to have a strong relevancy and correctness.
- The analysis has shown that some pairs of components could be merged into a new one.
- There were also components that did not receive support (text units seemed to be vague, not clear, mixed up with other ideas, or interviewees attempted to skip the topic during the conversations).
- In the group learning construct, we saw that some components evolved over time.

The analysis revealed 131 text units about *group learning*. The results of their discourse analysis are shown in Figure 6.5. Two out of 15 components of group learning–comparing with other software experiences, and attitudes towards the future state of the system–got little empirical support. These text units sounded oblique and unconvincing. Therefore, we marked them as "questionable" until the cross-case analysis. Two other components were difficult to differentiate between in the text units: demonstrating how to operate the system, and clarifying technology difficulties to other group members. We therefore decided to combine them until the cross-case analysis.

The rest of the components remained unchanged in terms of our operationalisation scheme. These components were seen as significant by a representative number of text accounts. The meanings of these units were transparent, clear, and fully corresponded with the research intention. We did not discover any 'underlying' implications in the expressions. Thus, we considered these components to be valid for the model.



"?"–a component had no support in this case study but is retained until the cross-case analysis
↑–the observable trend within a component
↔–no apparent progress within a component
AND–two components were combined following the analysis

Figure 6.5 Refined Group Learning components in the SAP_HR implementation

The interview analysis has shown that progress mostly took place in four components:

- searching for new techniques (after some months users began to have fun with the option "query" even though it was one of the most difficult functionalities in SAP_HR);
- discussing difficulties (employees broke out of the confines of their own P&O units and started talking openly about SAP_HR issues in the entire group of users);
- proposing new actions (after operating with the system became easier, the users realised that various technical and social points in the implementation could be improved);
- understanding how to operate with SAP_HR (after some months of working with the system, the users understood it better).

As with the analysis of the group learning processes, we executed a detailed analysis of the *managerial support* issues in line with the research model. The discourse analysis revealed 81 text units about the managerial support construct. The results are shown in Table 6.2.

We found five 'questionable' components: freedom in use of SAP_HR, authority in planning work with SAP_HR, consultation and informal learning, having time to

discuss the system, and managers' time allocated for end-users to disacuss implementation issues.

Analysis of these components has shown a vagueness or indirectness in the expressions, unbalanced linguistic versions, interference by the contextual factors, or an insignificant number of text accounts.

Two components were combined: recognition of the progress in working with the system, and rewards.

Autonomy and responsibility	responsibility of the end-users in decision-making freedom in use of IT? authority in planning work with the system?
Promoting learning opportunities	formal training sessions availability of material resources consultations and informal learning ?
Feedback	recognition of the progress in use of the system AND rewards
Management style	willingness of managers to help and coopertae with end-users consideration of users' ideas
Time	having time to practice having time to discuss the technology? managers' time allocated for end-users to discuss implementation issues ?

"?"–a component had no support in this case study but is retained until the cross-case analysis
AND–two components were combined folowing the analysis

Table 6.2. Refining components of Managerial Support in the SAP_HR implementation

The analysis of 61 text units about the *stable use* construct is presented in Table 6.3.

Ease-of-use	Perceived speed of operating with the technology? no difficulty in operating friendliness of the interface
Task-system fit	Perceived importance of the system for the tasks perceived quality and availability of the data for the members of the group ? perceived match of the system with the ways of working in a group

"?"–a component had no support in this case study but is retained until the cross-case analysis

Table 6.3. Refined components of Stable Use in the SAP_HR implementation

There were two 'questionable' components: speed of operating with SAP_HR, and perceived quality and availability of information. Strangely enough, perceived quality of information did not have support: 4 out of 7 text units sounded oblique and unconvincing. Possibly in the case of SAP_HR use, the quality of the data was not in

doubt except for some sudden mistakes. On balance, we marked this component as "questionable".

Having finalised the analysis, we can say that the AcademCentre case study has contributed further to the building of the research model. In total, nine components remain "questionable" until the cross-case analysis: five components from the managerial support construct, two components from the group learning construct, and two components from the stable use construct. Further, four components were merged into two pairs.

6.8.4 Conclusions and refining the research model

Our third case study has concerned the implementation of a personnel administration system in AcademCentre. Six months investigation allowed insights to be gained into the processes of adoption of the system by the user-group, managerial support for SAP_HR implementation, and indicators of the successes and failures of the project.

A new information technology–*mySAP HR*–was installed in the Salary and HR departments in several faculties, to an extent geographically dispersed in the organisation. Implementation of the technology improved only slowly and with many difficulties: the users started to get used to the system after 6-8 months of working with it. Even then, they still viewed SAP_HR as too complex, not supportive of many primary tasks, and difficult to operate.

This case study has again shown that the usefulness of the technology first determined what the group thought about it: the SAP_HR users disliked it from their first attempts to work with it.

Using traditional terminology, SAP_HR, in its AcademCentre version, can be labelled as representative of ERP systems in that it supported sequential collaboration. Its main role in AcademCentre was to replace the outdated previous IT, and the use of SAP_HR became mandatory.

The new technology was hard to understand and to work with, and it was difficult to learn new applications. In the perceptions of the users, it took a lot of effort from them to make transactions. It even demanded changes in the work culture of the personnel administrators–they had to become precise in calculating and codifying the inputs to the system (that was previously more a characteristic of the salary administrators).

The increasingly negative image of the HR departments, due to the problems with SAP_HR, contributed to the poor attitudes of the users towards the technology. From the very beginning, SAP_HR was not perceived of as useful.

With the introduction of SAP_HR, users had to change their ways of working significantly. The changes were obligatory and rapid as the users had to perform their daily primary tasks with the new technology. The new on-line collaboration imposed greater responsibilities in all the inputs. Therefore, they had to organise more intensive and earlier control over the performance.

The group of users that emerged consisted of personnel and salary administrators, with about 50 members spread among six units. We found diversity between the

personnel departments in terms of work rules, traditions, tasks divisions, and control over performance. The group did not exist when the system was introduced. The employees had never worked together as a team, they had different traditions and work idiosyncrasies, they were even located at different sites, and they had different software experience. The post-SAP group was largely led by the functional administration staff for the system, and these were not end-users of it. There were advanced users (key-users) who bridged the gap between the project management team and the end-users. Task interdependence was neither clarified nor operationalised before SAP_HR was introduced.

Once SAP_HR was operational, the users started to discuss it and use it. Our observations have confirmed–as in the other two case studies–the existence of all the five group learning processes, through which the employees developed the implementation of the technology. These were collective acting, group reflecting, knowledge disseminating, sharing understanding, and mutual adjustment. Such processes covered the interactions among the SAP_HR users about working with the new system, about its understanding, developing regulations to control the data, agreements on the traffic of inputs and outputs, correcting errors, and negotiating with the project team.

Group learning among the SAP_HR users emerged immediately the system was introduced. We have observed the slow but steady development of all the five group learning processes over time. Initially, the scope of the group learning was not sufficient to handle the system–interactions mostly took place at the level of the units. The lack of communication and misunderstandings in the entire group of users led to mistakes in working with the system when it was first introduced. The system triggered group learning with a call to redirect all five learning processes towards a new community. After eight months, group learning took the direction towards stronger cross-unit cooperation and the exchange of user experiences.

After 7-8 months of system use, the users: started searching for new techniques, especially in the module "Query"; discussed it more openly through attending the key-user meetings and discussing SAP_HR difficulties with colleagues from other P&O departments; and saw an improvement in their understanding of how to operate the system. They had realised the principles and main ideas of the technology.

Thus, we can again confirm the dynamic character of group learning processes. In this case study, we have seen the signs of group learning progress: indicators pointing in the 'right' direction. We observed the following signs of progress in group learning:

- Increased activity in searching for new possibilities in the system;
- Increased intensity of discussions around SAP_HR, and the involvement of the entire group in such discussions;
- Bringing proposals on improvements to system functionality;
- Improved conceptual understanding of the system.

We assume that these processes were the most flexible in terms of group learning and, therefore, the most responsive to managerial support. Progress was achieved through changes in the structural arrangements executed by the project team.

We found that initially there were no structural arrangements to support discussions. Only training sessions and manuals about the system were available to support the users. However, neither the training sessions nor the manual were sufficient–in many units, the users developed their own smaller manuals on specific aspects of SAP_HR use. The users did not have a choice: the use of the system was mandatory, and the pressure from the 'top' gave no other choice for the employees than to struggle on with *mySAP HR*. We did not see the users being convinced about their individual needs in SAP_HR before the system was introduced. The gap between the organisational mission of the system and the individual needs of the employees within it was not analysed and closed. New interdependence lines, and the tasks to be automated by the technology were not defined and operationalised.

After several months, following requests from the users, new structural supports were introduced such as a help-desk, a telephone list, and feedback from IPA. These all reinforced the group interaction processes and re-oriented them towards improving the use of SAP_HR.

In summarising the conclusions from this case study, we would emphasise the following findings:

- the live implementation of SAP_HR was dampened by the negative attitudes of the users: the system was not perceived as useful for their tasks;
- group learning emerged as soon as SAP_HR was introduced to the networked users, and resulted from the disappointments felt about the technology;
- pessimistic perceptions of the system gave a negative start to the group interactions, all the learning processes in the group were oriented against adopting SAP_HR;
- the lack of strong structural and non-structural group characteristics initially negatively influenced the learning processes in the group;
- the managerial support was not adequate for the introduction of such a complex IT: job tasks and their divisions were not structured and operationalised in advance, the goals of the system were not transferred to the level of the individual needs of the users;
- group learning was triggered by the technology and had to expand its scope from that of the sub-units to cover the entire group;
- the project team did manage to redirect group learning by introducing important structural arrangements such as adequate learning opportunities, help-desk facilities, electronic feedback, and regular discussions;
- the discourse analysis has revealed that the progress in group learning was mainly a result of improving the knowledge acquisition processes: collective acting, knowledge disseminating, and sharing understanding;
- indicators of the positive developments in group learning were: the increasing intensity of searching for new techniques in the system, increased discussions in the group about SAP_HR, a growing number of proposals to improve the implementation, and advances in the conceptual understanding of the technology;
- the strict, mandatory use of the technology required careful coaching of the group learning processes.

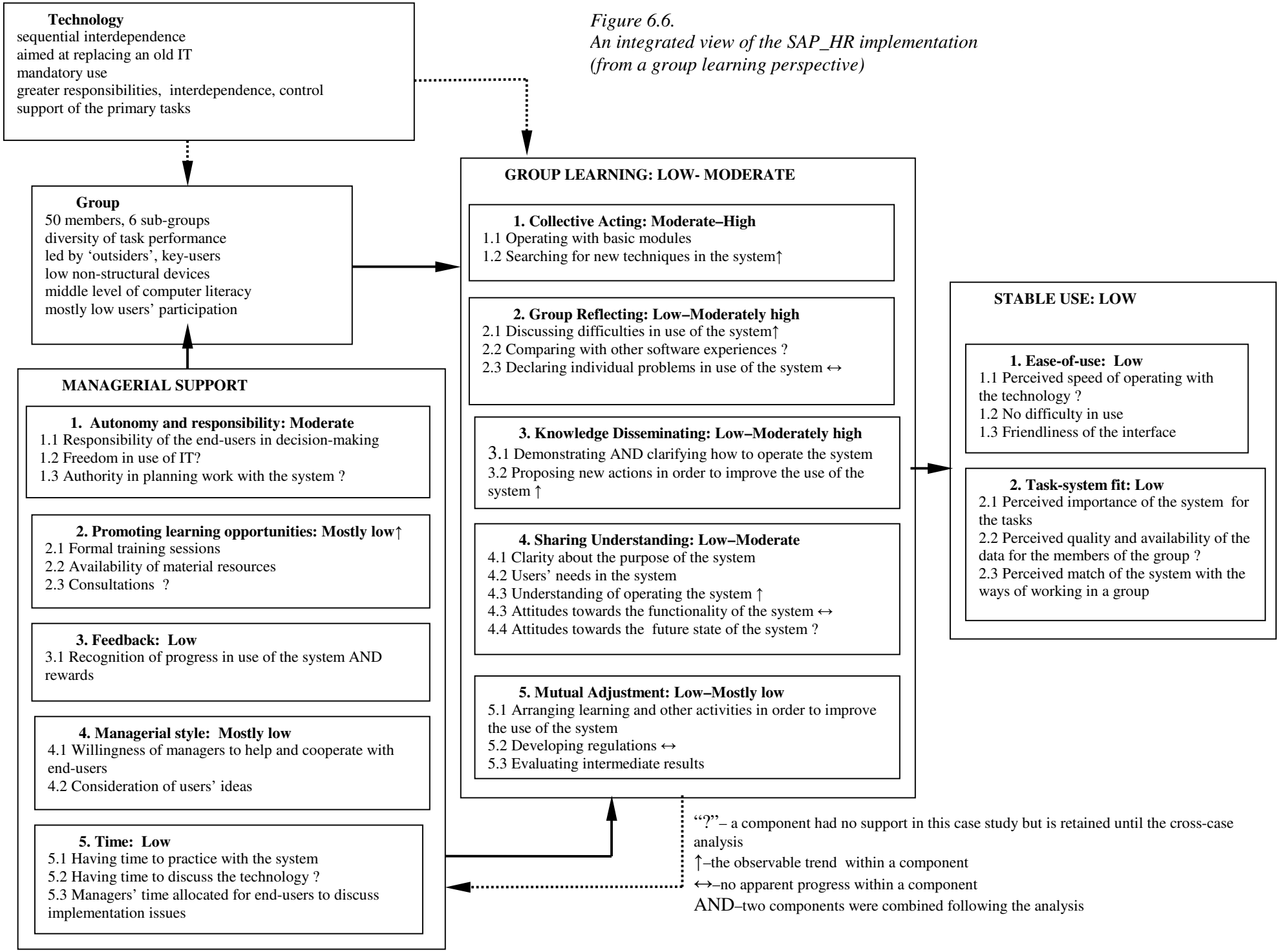


Figure 6.6.
An integrated view of the SAP_HR implementation
(from a group learning perspective)

7. REFLECTIONS AND CONCLUSIONS

Our scientific curiosity in IT research was initiated by the following conundrum: on the one hand, innumerable IT studies since the 1960s have suggested how to successfully implement new information technologies in organisations with respect to the various factors, processes, and organisational circumstances; on the other hand, despite this advice, IT failures clearly continue to trouble organisations. IT projects are known to be time consuming and impulsive, end-users are repeatedly criticising 'perfect' engineering innovations, and researchers are complaining that their recommendations are not put into practice.

We have followed the interpretive tradition and considered IT implementation to be a dynamic process that is likely to develop through complications, contradictions, and uncertainties; and therefore not to be fully predictable and prescribed before it 'goes live' to the users. The core idea in our understanding of IT implementation is that it is the adoption of technology by employees. Having recognised that the implementation trajectory starts from the *idea* of acquiring a new system, and then develops through such stages as design, project preparation, system installation, and its appropriation by the end-users; we decided to focus our investigation on a limited part of this process, starting when the technology goes live.

We view the main contribution of this thesis as twofold. First, a novel lens for looking at IT implementation is introduced: IT implementation is conceptualised as a group learning process. Second, practical guidelines for conducting discourse analysis in IT research, as a method to capture the dynamic character of the interactional process in a group of IT users, are conceptualised and developed.

7.1 INTRODUCTION

The theoretical discussion on the various views on IT implementation led us to a definition for this research project:

IT implementation is the adoption of a system during the transition period between the technical installation of a new system and its skilful and task-consistent use by a group of the targeted employees.

This definition stresses our view that users construct IT implementation, and that the building blocks are how people develop their understanding and practice with the technology. Stable use implies that employees are working with the system without huge efforts and consistent with their job tasks. In other words, this implies that users are operating with a technology successfully when they believe that their job tasks can be better performed with the technology than without it, and that the technology is not that difficult to work with.

We have observed the implementation of technologies in three real life settings. Only one of them could be characterised as successful, while in the others the IT implementation either failed outright (decentralised use of Beaufort, and the KennisNet implementation) or took much more effort than anticipated (SAP_HR implementation).

Another focus in our research was on a specific type of information technology that supports collaboration, so-called groupware systems. We began this research with the belief that it was neither the quality of the technology, nor that of the individual users, but the interactions among the users concerning a new system (known as group learning) that determines the success or otherwise of IT implementation. We have thus put the users at the heart of IT implementation and shown that they have the potential to accelerate or slow down (or even grind to a halt) a project through the success or otherwise of group learning. This means that they have a responsibility to get used to a technology and steer implementation towards a stable use of the IT. This conclusion shapes the *group* essence in the implementation of *group*ware. Therefore, in carrying out this study, we wanted to conceptualise IT implementation as a group learning process.

This research project was guided by the central research question,

What is the role of group learning in the implementation of groupware by groups of users from its technical installation until its successful use?

In Chapter 2 of this thesis, we broke the central research question down into three components:

- What kinds of group learning processes influence groupware implementation?
- To what extent does group learning contribute to the success of groupware implementation?
- What kinds of managerial support is needed to stimulate these group learning processes?

Attempting to answer these questions guided us towards this final chapter; on the way we developed a model from the literature review, conducted case studies, reflected on our findings, and raised further questions. Therefore, we see the goal of this chapter as not only summing up the findings but also looking at the way ahead. The aforementioned research questions will be answered as follows in this chapter.

Firstly, we will elaborate on the central construct in the research model–group learning, and we will discuss its theoretical perspective and our empirical findings. Secondly, we will present a construct for successful IT implementation. Thirdly, we will continue the discussion based on the research model and describe the conditions that, in our view, are important in promoting a constructive implementation of groupware technology. These are categorised as specific characteristics of the technologies, features of groups of users, and managerial support. Then we discuss the methodological approach employed in this study, its advantages, and its limitations. It will be followed by an examination of our final concept of groupware implementation though group learning. To conclude this thesis, we make some proposals for future research.

7.2 WHAT IS THE ROLE OF GROUP LEARNING IN GROUPWARE IMPLEMENTATION?

This question was at the heart of our research. We wanted to understand how people constituted their work with a newly introduced IT through group learning processes. In this section, we will first reflect on the theoretical concept developed from the literature, and then summarise our findings from the three case studies.

7.2.1 Group learning from a theoretical perspective

In Chapters 1 and 2, a tentative research model of group learning was developed. We began our theoretical discussion from the understanding of IT implementation as a user-centred process wherein the networked employees together develop their interpretive schemes about a newly introduced technology. 'Developing interpretive schemes together' became crucial in the research as we focused on the human-human interactions during the use of an information technology. This was called the group essence in IT implementation: developing a common understanding about working with the system through storytelling, giving advice, complaining, sharing experiences, and recalling good or bad episodes in using the technology. However, the communicating processes are themselves a part of the complex organisational lives of employees when they want to, or have to, work with a new system. Therefore, it was important to understand the characteristics of the complex group interactional learning processes involved in the development of group interpretive schemes about a technology.

It was argued that although significant work has addressed organisational learning and information technology (e.g. Caron et al., 1994; Yetton et al., 1994; Robey et al., 2000, Levine, 2001), the existing literature lacks a systematic theoretical elaboration on group learning in IT implementation. There is a body of case study literature that shows the importance of experience and the 'lessons learnt' approach in IT projects. However, such questions as to how organisations can transfer an old experience into a new situation, what are the common key issues and processes in experience-based learning, and when and where are the lessons applied and really learnt, are left without clear answers. The literature search has also convinced us that the group learning processes in IT implementation lack a well thought out conceptualisation. All these findings led towards the desire to further elaborate experience-based group learning in IT implementation.

In this study, we base our concept of group learning on the model of experiential learning by Kolb (1984), where learning is considered as: (1) a process rather than only outcomes; (2) a problem-solving process that is always practice-oriented; and (3) a mechanism for everyday activities, occurring both consciously and unconsciously. The transformation of the individual learning circle to a group learning circle led to a shift from the wheel of "doing–reflecting–thinking–deciding" (Kolb, 1984), to a collective one comprising "collective acting–group reflecting–knowledge disseminating–sharing understanding–mutual adjustment". In Chapter 2, these processes were described in detail. We observed that the key challenge in the new

circle lay in the knowledge domain. Knowledge cannot be completely reproduced or transferred, and therefore group learning is more than simply the multiplication of individual learning processes: the character of group processes becomes more complex as they acquire a social context. Our discussion firstly addressed the views of the researchers who had criticised Kolb's model for its centrality of individual experience and lack of social aspects (Holman et al., 1997; Vince, 1998; Reynolds, 1999; Kayes, 2002), and then proposed a step forward by elaborating on the experience-based group learning cycle.

Following the experiential learning tradition, we consider group learning to be the interplay between knowledge acquisition and knowledge transformation. Knowledge acquisition involves the tension between group 'doing' (apprehension) and group 'thinking' (comprehension) processes. Group 'thinking' represents the vital difference to the individual learning circle: it involves two processes: disseminating knowledge and sharing understanding. Knowledge transformation is characterised as a dialectical movement between group reflecting and group 'deciding', or adjustments.

The following definition of group learning in IT implementation became central to our research:

Group learning in groupware implementation is defined as all the interactional processes in a group, through which group members develop their interpretive schemes about a newly introduced technology, and that help them to adopt it.

With this definition, we stress four issues: (a) learning is a process-based activity, (b) it rests on the interaction processes between members of a group, (c) these processes begin when a new system is introduced, and (d) these processes lead to changes in knowledge about the system and in users' behaviour (ways of operating the system).

Five group learning processes were specified as follows:

- Collective acting being the task-related operations with the system undertaken by members of a group. After a system is introduced to employees, they begin to use it in order to fulfil the tasks: they operate with the essential, and possibly the optional, functionalities; and they search for new possibilities, etc.
- Group reflecting is the communicating upon the extent to which the system supports the performance of tasks. Examples of group reflecting in IT implementation are discussing errors, declaring individual difficulties in operating with the IT, asking questions, and comparing to other software experiences.
- Knowledge disseminating–behaviours by group members that aim at the externalisation of ideas about the system in order to improve its usage. This process is important because it makes the tacit knowledge about technology, and its use, explicit and available for the other members of the group through presentations, demonstrations of how to operate with different modules, and clarifying difficulties.
- Sharing understanding–creating a common meaning of the system regarding its role and its functionality. At this stage, users internalise the ideas and information about the technology in such a way that it becomes their personal

knowledge, in other words this step implies the transformation of explicit knowledge into tacit knowledge. The shared knowledge includes common attitudes towards the technical and content functionality of the system, its intention for a company and for a user, and understanding how to work with it.

- Mutual adjustment–activities that aim at collective agreements on the use of the system in a group. This step links discussions and shared understanding with actions–concrete rules on how to work with the system, suggestions for further improvements, and plans to arrange activities to improve the use of the system.

It was argued that it was not the quality of the technology, and not even that of the individual users, but these five interaction processes among the users that critically influences the success or otherwise of a newly introduced information technology.

7.2.2 Reflections on the findings from the case studies

During the longitudinal case studies, we exemplified and deepened our understanding of group learning processes in IT implementation.

After all the cases had been studied, what could we conclude about group learning in the implementation of information technology? To start with, we have observed the real existence of all the five processes that we operationalised. In the implementation of the Beaufort system in the Medinet case study, the PSA group practiced with the system and actively discussed that experience, searched for new possibilities in the "Informer" module and communicated upon it, clarified difficulties for colleagues, talked about errors during special breaks, initiated new instructions to further learn the system, evaluated its use at different stages, etc. The community of non-life insurance specialists in the InsurOrg case study demonstrated that their group learning included such processes as operating with Kennis Bank and the Portal, proposing many ways on how to improve the usage of the system, and suggesting design ideas to make it more user-friendly. The group of personnel and salary administrators in the AcademCentre case study actively discussed the implementation issues during the key-users meetings, composed additional manuals on how to apply the 'general rules' of SAP_HR to their concrete practice, and introduced a special feedback form to report all the mistakes.

As a result of our research, we are in a position to propose seven statements on the roles of group learning:

(1) Group learning emerges immediately after a new system is introduced to the targeted networked users.

The first observation is that group learning emerges as soon as a new technology is introduced to the targeted group of users. We saw in all the case studies that the users began to talk about the system, spread their interpretations of it, joked, 'multiplied' their attitudes towards the system's functionality; or ignored it, complained to each other, and blamed the system– immediately after they had the opportunity to operate

it. This provides the first warning for management–these processes cannot be avoided, they will definitely start as soon as you introduce a system to the networked users, and they will influence what happens next!

(2) *Group learning may take different directions from the very beginning: for or against adoption of the system. The initial direction of group learning is provoked by: a/ the usefulness of the technology for the job tasks, and b/ the clarity of the tasks to be automated.*

We saw that the directions group learning takes can be very different. Group learning can be oriented *towards* usage of technology, but in only one of our four situations were the users optimistic about the technology from the very beginning.

When Beaufort was introduced to the PSA department in Medinet, there were no changes in the users' job tasks. Although, initially, it was not very easy to work with the system, the employees were ready to invest time and effort to discover its possibilities as they were convinced of its potential usefulness in their jobs. The system helped them to execute their everyday tasks, and it matched both the way people used to work and the interdependence lines in the department. The PSA employees helped each other to improve their understanding of Beaufort, and overcame small doubts about the system by seeing its benefits over its limitations. The users' positive feelings about Beaufort's relevance for their work grew daily.

The second possibility we observed was that group learning could be oriented *against* the usage of the technology. In the other three situations we saw that the initial frustration with the technology initiated a spiral of 'negative' group learning processes.

Beaufort brought many changes to the tasks of the decentralised users in the Medinet case study: greater responsibilities for secondary tasks, new content in those tasks, and the necessity to be highly interdependent with other users whom they hardly knew before. They did not want to accept a sudden increase in the importance of tasks that were formerly considered boring. Some users did not even try to work with Beaufort after the stories they heard from those who had. As a result, this group 'created' a consensus of Beaufort as useless from the beginning.

In the InsurOrg case study, KennisNet did not result in changes to the job tasks of the non-life insurance professionals. However, the main goal of the system (building a team among the users) was not transferred to the level of the individual needs of the users. A lack of clarity about what kind of information to input and share, and with whom and why, lowered the job relevance of KennisNet in the users' perceptions. Further, the following all created disappointment with the system from the beginning: it seemed to work too slowly; the unsophisticated interface required additional efforts to operate KennisNet; overlaps between the insurance subjects that appeared on the screens of KennisNet caused confusion; and there were technical limitations in searching information. It did not fit with the users' expectations. As a consequence, the group of KennisNet users developed a negative group interpretive scheme on both the implementation process and the job relevance of the system.

In the AcademCentre case study, personnel and salary administrators experienced significant changes in their daily tasks following the introduction of the SAP_HR system: greater responsibilities for making online inputs, stronger control over these inputs, the necessity to be interdependent, and a need to collaborate across the users of the entire group, many of whom they did not know before. Stress and uncertainty linked to making incorrect inputs to SAP_HR stimulated a negative interpretation of the technology among the users from the start: they did not want to invest a lot of effort and were disappointed with the technology. Further, from the beginning, the users assumed that the system was not useful for their job tasks. These negative feelings about SAP_HR were reinforced daily by the collection and accumulation of many disappointments, including small details and misunderstandings with the project team and the communication of these throughout the user group.

These observations support the findings elsewhere that show that one of the main bases for users' interpretations about an information technology is its usefulness for the job tasks (see the findings of Davis et al., 1989; Joshi, 1991; Adams et al., 1992; Morris and Venkatesh, 2000; Venkantesh, 2000; Brown et al., 2002). We have added to these earlier findings by observing that the perceived usefulness of the technology steers the initial direction of the group learning processes, either positively or negatively.

(3) Group learning can develop during the implementation process and either progress or take a turn for the worse.

However, from the initial reactions discussed above, group learning can further develop during the implementation process. The existing literature does not elaborate on how and why it can develop and, in contrast, our research has shown that group learning is not a fixed matter but can improve or falter as users work with a technology.

We have observed that group learning *can* continue its development in the direction that it took soon after system introduction:

- In the PSA department (Medinet case study), group learning continued to progress straightforwardly from the beginning: the users became more and more enthusiastic about Beaufort and encouraged each other to adopt the advantages of the system.
- In the InsurOrg case study, group learning faltered amongst the KennisNet users once the system was introduced, and it continued in the same direction with the group attitudes going from highly enthusiastic, before the KennisNet introduction, to an indifference towards the system within two months of using it.

We have also seen that group learning may change its initial direction:

- In the AcademCentre case study, group learning progressed through many difficulties amongst the SAP_HR users, and changed the group interpretations of the system from extremely negative to optimistic.

(4) The essential 'learning' results of group learning in IT implementation are interpretive schemes about the technology.

The development of group learning influences the development of users' interpretations of a system, and these are considered as 'learning outcomes'. A role of group learning in IT implementation is 'supervising' the process of changing users' knowledge, skills, and attitudes about the system. A group builds its interpretations and attitudes towards a system. This leads to new interpretive schemes about the technology (learning outcomes). Our observations suggest that group learning has the latent possibility to multiply the knowledge of the users about the system and the ways in which to operate it. The result of group learning is that a group is more than the sum of its parts; all employees have the potential to work with the system at a higher level than they would ever achieve individually. In this conclusion, we concur with research findings in the field of collective learning (Kagan, 1993; Nolinske and Millis, 1999). It means that, through group learning, employees can more quickly achieve a full understanding of the technological services offered by a system and exploit them to the maximum. We witnessed how quickly newcomers in the PSA department got involved in operating Beaufort with the help of 'peer teachers'. We also observed how self-made manuals on SAP_HR provided a range of very useful 'tips' on using the system to everybody in the group of users, effectively helping them on their way.

The next statement explains why the process of building interpretive schemes is important.

(5) Group learning has the potential to speed up or slow down the IT implementation process.

We saw that group learning could develop over time. We also saw that that this development became a 'hidden' mechanism for speeding up or slowing implementation, or even for the termination of an IT project (as with the decentralised users in the Medinet case study).

If a group of users appreciate the technological help provided for their tasks, share positive attitudes, help each other, and attribute growth in performance to the system, then, in such a scenario, people will learn the relevant issues about a technology. In so doing, the system is discovered, 'studied', and better understood; and, with this, the technology becomes more relevant for the job tasks and easier to work with. This will lead to a better and quicker acceptance by the users. In other words, a positive development in group learning will signal quick progress that positively influences interpretations of the technology and leads to constructive action–a quicker acceptance of it. An example of such a chain of events was seen in the Beaufort implementation by the PSA department.

The opposite scenario was observed when the users together only complained about the system, perceived it negatively, and convinced each other of its uselessness. Even small details, that in other situations would be ignored, received group attention. In such a scenario, employees obtain ideas that oppose previous ones. They increase their negative views about the relevance of the system for their tasks and see the technology as too complex to operate. So, the technology becomes 'even less relevant' for the job in the opinions of the users, and they learn issues that do not motivate them to accept the system. For example, the negative spiral in group learning

development in the InsurOrg case study resulted in the users regretting the technology based on the company's Intranet and on the well-known and respected Lotus Notes.

This role of group learning is as a catalyst, a cold shower, or a spark to fire an IT project. The failure or success of the IT project is magnified in the direction of group learning: whether this is oriented towards or against adoption of the technology.

(6) Most progress/regression in group learning was observed during the knowledge acquisition processes. Signs of group learning progress or regression can be recognised during the first one to two months of the implementation process.

Recognising the above role of group learning, the next issue is whether it is possible for managers to identify the direction of group learning development over time.

The detailed discourse analysis of the case study materials has revealed that, in all the case studies, the developments in group learning were mainly related to the progress (or lack of) in the knowledge acquisition processes (collective acting, knowledge disseminating, and sharing understanding), and less so by the knowledge transformation processes (group discussions and mutual adjustment). In Chapters 4 to 6 we have developed integrated pictures of the IT implementations where we have highlighted those processes that progressed or stalled the most.

In this section, we summarise those signs of group learning development that can be recognised early on–during the first two months of a technology 'going live'.

Signs of positive development in the knowledge acquisition dimension in group learning were:

- growing intensity of working with the basic services offered by the system (for example, within one month of Beaufort being introduced, the PSA employees gradually but quickly mastered all the options in the basic modules of the system);
- increasing activities involving searching for new possibilities in the system (for example, the SAP_HR users began to 'have fun' with the Query option that was, in reality, one of the most difficult options in SAP_HR);
- an increasing number of proposals for improvements to the system and its implementation (we classified those proposals into three types: technical properties of the system, organisation of information to be input, and group regulations concerning use of the system);
- improving conceptual understanding of the technology (especially understanding the why and the what of the technology–and not only the how);
- discovering, recognising, and acknowledging individual user needs in the technology (for example, the PSA employees in Medinet expressed the view that they were not committed to the central mission of Beaufort which they saw as the decentralisation of the personnel services. However, after one month of working with it, they realised that the system addressed their own needs in accelerating personnel administration and in searching for archive data).

A sign of a positive development in the knowledge transformation dimension in group learning was:

- an increasing intensity of discussions about the system among the entire group of users. This is most relevant for those groups of users that only emerge *because* of the system introduction (for example, we saw that SAP_HR users crossed the boundaries of their P&O units and started to talk openly about the technology across the entire group).

Our observations have also shown other possibilities for recognising a positive group learning development: users expressing satisfaction with the system's functionality and its usefulness for their tasks, showing an interest in new technological applications, and asking questions and making statements about their acceptance of the system's functionalities.

A negative development in group learning can be recognised from opposite signs to those listed above. In two of our cases, IT implementation was not successful–the decentralised use of Beaufort, and the KennisNet implementation. Discourse analysis enables one to distinguish the signs of group learning regression in the early stages of implementation.

Signs of negative development in the knowledge acquisition dimension in group learning were:

- a decline in operating with the basic modules (in the event of optional use, not operating with them at all; in a case of mandatory use, a decline in the number of operations to the minimum and postponing them where possible. Such developments can be recognised and analysed from the entries recorded in the system);
- a disruption in the flow of new ideas for improving the technology and its implementation (for example, KennisNet users were very active in proposing new ideas during the first week of the KennisNet implementation, but after one month none of them were coming up with proposals, and even refused to discuss them);
- expressing negative attitudes towards the system's functionality;
- users' doubt their need for the technology.

A clear sign of negative development in the knowledge transformation dimension in group learning was:

- a decrease in the intensity of discussions on the technology (for example, the KennisNet users became indifferent to starting discussions).

Other possibilities of recognising a negative development in group learning were: an increase in users' complaints about the technology, fault-finding questions and remarks, in the case of voluntary use postponing operating with the system, and resisting learning new modules.

(7) The development of the knowledge acquisition processes was promoted by structural arrangements in the groups of users, and in practice this took less effort than the promotion of knowledge transformation processes.

We saw that the knowledge acquisition processes were flexible and dynamic. Therefore, we assert that those responsible for the implementation of a new system should pay special attention to the collective acting, knowledge disseminating, and

sharing of understanding processes. We also noted that progress was achieved by shaping the structural group characteristics and arrangements such as task reassignment, offering learning possibilities, and setting up discussions. We will elaborate more on this topic in the section on managerial support for IT implementation.

We observed that the group reflecting and mutual adjustment processes were related to the non-structural characteristics of the group such as psychological safety, knowing each other, trust, and experience in working together. These devices take more time and effort to establish in new groups of users (such as the decentralised users of Beaufort and the SAP_HR users), and therefore the knowledge transformation processes will develop more slowly in new groups. The group of SAP_HR users in AcademCentre established these processes after 6-8 months of working together with the system.

7.2.3 Refining the group learning construct in the research model

After each case study, we sharpened the content of the dimensions in the construct of group learning in the research model. In this section, we will finalise the revision of the relevancy of the components of this construct.

In each case study, we found that:

- some components in the group learning construct could remain unchanged in the model on the basis of their representation in the text units, their strong relevancy, and the linguistic accuracy;
- some components could be revised by combining two of the original ones;
- some components were not supported (text units seemed to be vague, unclear, mixed up with other ideas; or interviewees attempted to skip the topic during the conversations).

We modified the construct based on the following 'logic':

- if a component received full support in all the case studies, we retained it unchanged in the final research model and considered it to be important for the group learning construct;
- if a component was judged to be 'questionable until the cross-case analysis', we compared the results from the three case studies. If the component was 'questionable' in all the cases, we judged it as not relevant for the group learning construct and removed it from the model. If the component was 'questionable' in only one or two cases, we judged it as contextually important–the component did not have a strong but only a contextually-based significance;
- if two components had been merged after a case study, we also compared the results from the other cases: if the combination was supported in all the case studies we judged it to be a new, refined component in the research model; if the two components were not combined in all case studies, we kept them separate.

The results of this cross-case analysis have shown that:

- One component was not supported in any of the case studies, and we therefore removed it from the research model. This was the 'comparing with other software experiences' component.
- Three components did not receive empirical support in all cases but only in one or two, and were thus retained in the final model as contextually important: 'proposing new actions in order to improve the use of the system', 'arranging learning and other activities to improve use of the system', and 'attitudes towards the future state of the system'.
- All three case studies revealed that two components–'demonstrating how to operate the system' and 'clarifying difficulties to other members of the group'– could be combined into one. Therefore, in the final model, these are replaced by a single component 'demonstrating and clarifying how to operate the system'.
- The rest of the components could be retained.

7.3 SUCCESS OF IT IMPLEMENTATION

The literature suggests two main indicators for successful IT projects: meeting timescales and meeting budgets (see for example, Ewusi-Mensah and Przasnyski, 1994). We acknowledge the importance of these two indicators, but we would argue they are not sufficient on their own.

We introduced the construct of *stable use* of technology, understood as the skilful and task-consistent use of a system. It was argued that IT implementation can be considered as successful *when* employees work with the system in a stable way, i.e. without it requiring large efforts, and consistently with their job tasks. This means that the users are seen as successfully operating with the technology when they believe that their job tasks can be better performed with the technology than without it, and when the technology is not that difficult to work with. Put in other words, people are deemed to work with IT successfully when the 'technical' and the 'content' functionalities of the information technology fit the tasks. This idea is not completely new, and we have described it in the theoretical chapter where one of the streams of traditional IT studies stresses the need for strong job relevance in a system (Davis, 1989; Adams et al., 1992; Morris and Venkantesh, 2000; Brown et al., 2002).

After each case study, we sharpened the research model contents of the dimensions in the construct of stable use of the technology. In this section, we finalise the revision of the relevancy of the components in this construct. The analysis procedure is similar to the one used above to refine the group learning construct and, therefore, we proceed immediately to the results.

The results of the cross-case analysis have shown that:

Two components did not receive support in all the three case studies, and we therefore excluded them from the research model. These were: 'speed of operating with the technology' and 'perceived availability and quality of the data for the group'. The rest of the components were retained.

7.4 CONDITIONS FOR GROUP LEARNING IN IT IMPLEMENTATION

Having read our thesis, it is apparent that group learning should be carefully stressed during IT implementation. In this section, we present the findings and finalise the conditions that support, in our view, constructive group learning. The various findings are combined into three categories:

- Characteristics of the technology
- Characteristics of groups of users
- Managerial support.

7.4.1 Characteristics of the technology

In the case studies we observed the implementation of three different technologies: an ERP system (Beaufort for decentralised users), Document Sharing systems (Beaufort for the PSA department and KennisNet), and a WorkFlow system (a SAP_HR version in AcademCentre). Despite the differences in the architectural design and specifications of the technical parts of these systems, they all have, what we call, collaborative fragments, i.e. modules that require collaboration amongst the users. In all the case studies, the users had to share information and communicate, but with varying intensities and responsibilities, and in different sequences. We observed a wide range of collaboration types: from balanced interdependence (InsurOrg case study) to associated interdependence (Medinet case study).

The relevant findings from the case studies can be summarised in two statements.

(1) The information technology will provide preconditions for constructive group learning if it has strong job relevance for the users. That, in our view, includes providing good support for existing tasks without demanding changes to them.

We found it necessary to distinguish two roles for a system in a company: the intention for the whole organisation, and the particular role for the end-users. We observed that the users–'targets of technology'–had to first become committed to the technology at the level of their job tasks, and only then would they work towards what was supposed to be achieved in the company with the new IT. The most illustrative example was the case of the decentralised users of the Beaufort system: while they accepted the role of the technology for the whole company, as targeted users they did not need the system for their own job tasks and hence constructive group learning did not occur.

The case studies demonstrate that the fewer changes in job tasks triggered by a technology, the less effort is needed to steer group learning towards adoption of the system. In two of the settings, the technology brought new content to the tasks, greater responsibilities in task performance, and a stricter control over inputs (Beaufort implementation by the decentralised users, and SAP_HR implementation). As a result, the users had to serve the system rather than getting support from it. Consequently, the first interpretive schemes about the system were negative, and this initiated a negative development in group learning. In the other two settings, there were no changes to

task performance and the users had to invest less effort in implementation (use of Beaufort by the PSA department, and use of KennisNet).

(2) If technology brings a higher level of task interdependence than existed in the pre-technology situation, there is a need to establish collaboration among the users and to operationalise their tasks that are to be automated.

We have also observed that the greater the level of task interdependence required by the system, the greater the effort that is needed to establish collaboration amongst the users, to redirect group learning towards the level of the entire group of users, and achieve the stable use of the technology. For example, if we compare the Beaufort implementation for the decentralised users and for the PSA department, we see that, in the PSA department, Beaufort inherently required reciprocal task interdependence which was less complex than the associated task interdependence required by the same system among the decentralised users. We then observed that group learning amongst the decentralised users required more effort than amongst the PSA employees.

There was an interesting finding with respect to the freedom given to the employees in their use of the technology. In two cases, the use of the system was mandatory (Beaufort for the PSA group, and SAP_HR), while in the other two it was optional (Beaufort for the decentralised users, and KennisNet). The case study findings suggest that if system use is optional then it must have very clear job relevance to be adopted, i.e. the technology has to demonstrate its own value. In the 'obligatory' cases we saw a need for appropriate conditions to support group learning in the implementation process. These conditions concerned the employees' needs in working together with the system or, in other words, there has to be a strong task interdependency through the technology.

7.4.2 Characteristics of groups of users

We have divided the group characteristics which are important for 'appropriate' group learning in IT implementation into two sets: structural and non-structural. The structural group characteristics influence the knowledge acquisition processes in group learning, and the non-structural ones the knowledge transformation processes.

The findings show that there is only one structural characteristic relevant for IT implementation–task interdependence. We observed that the clarity of the task interdependence (division and definitions) affected the process of shaping a group of users during the implementation process. For example, the tasks for the users of KennisNet were not divided and clarified prior to the introduction of KennisNet and, as a consequence, the employees did not collaborate through the system. The interdependence lines for the new tasks of the personnel administrators in the AcademCentre case study were likewise not clarified, and the group building experienced many difficulties during the implementation process. The implication is that task operationalisation (division, definitions) should be settled and clarified for the users before the introduction of a technology.

There was a lack of empirical support to suggest that other structural characteristics of user groups influence the success of implementation. We observed different types of groups: large versus small (50 users of SAP_HR and 17 users of Beaufort), manager-led versus autonomous (the PSA group and the decentralised users), and a virtual team (the group of KennisNet users). We did not find any relationship between the type and size of a group and group learning.

The second set of group characteristics, non-structural devices, includes trust, knowing each other's strengths, and open, risk-taking conversations. These characteristics were seen to develop during an IT project. The largest improvement in the non-structural group features we witnessed took place among the users of SAP_HR. At the beginning, they hardly knew each other; but after a couple of months they felt safe enough to speak up. This finding makes it clear that a group can develop during the implementation of a technology.

Those responsible for groupware implementation, in our view, have two options in respect of building groups of users in advance. Firstly, they can ignore team building activities on the grounds that it will take too much effort to convince future users of the necessity to become a team before they can sense it for themselves. However, stimulating group discussions and other team building actions must then be undertaken after the system goes live. We saw this scenario in three situations. The alternative is to begin building non-structural mechanisms such as trust, and knowing and understanding each other during the preparation stages in IT projects, i.e. before the introduction of the system to the users. We did not see this scenario in practice, although we believe that establishing strong non-structural devices within a potential group of the users may lead to a good start in the group reflecting processes when the technology becomes live.

7.4.3 Managerial support for group learning in IT implementation

Since the 1970s, information technologies have been viewed as "competitive weapons" in organisations (Parsons, 1983) and, since the same period, social issues have been perceived to be of paramount importance in IT implementation. However, the research by Doherty and King (1998) suggests that there is no relationship between the perceived importance of social issues and their treatment. The authors note that such a pronouncement is worrying as it indicates that many practitioners (especially those responsible for IT implementation) who perceive social issues to be of greater importance than technical ones in IT implementation, are treating those issues only implicitly, or in many cases not at all. No matter how important they think they are, their treatment is often woefully inadequate. Consequently, in many cases, the treatment is simply left to chance (Doherty and King, 1998).

We have limited the consideration of project management issues to those relevant to group learning and groupware implementation. These issues were the autonomy and responsibility given to the users in their work with a newly introduced system, the learning opportunities available to the users to become skilled with the technology, the feedback provided to the users regarding their progress in using the system, whether

the management style was oriented towards cooperation with the users, and the time allowed for practicing and discovering the system.

Following the theoretical discussion, we defined managerial support as *the organisational arrangements and managerial behavioural patterns for technology implementation aimed at encouraging the use of the system.*

Reflections on the findings

If we look at the reality of IT projects, we must acknowledge that the project teams see various complicating circumstances surrounding IT implementation, including: budget limitations, political games in a company, agreements with a consultancy firm, availability of resources, and technological infrastructure. Having acknowledged the importance of the specific circumstances, our research suggests that project leaders should realise that these complications are explicitly or implicitly transferred to the work reality of the end-users who are forced to, or want to, work with a new technology. Therefore, we would propose that project leaders take off their rose-tinted spectacles and acknowledge the range of complex issues that groups of users (and the project) might face. Having accepted this, it should not be a big step to be honest and inform future users about the difficulties foreseen in a project, and at the same time encourage strong teamwork instead of promising a quick fix. Thus, the first step for the managers is to switch from seeing IT implementation as a predictable 'one click' process towards understanding its contradictory nature. There is also a need to realise that interaction processes among the users can either speed up or kill the implementation, as we have seen in the case studies. Therefore, it is important to appreciate the role of group learning in IT implementation. If managers accept its importance, and attempt to advance it, then group learning processes might become a catalyst for the success of a project.

Such a mindset is the first precondition for supporting and keeping group learning processes moving in the right direction. The next includes controlling and/or building conditions that encourage group learning, as discussed earlier.

In our view, before introducing a system, it is crucial to conceptualise its importance for the users, and to convince them of its relevance. Technology may have, as we saw, a high-level strategic mission. However, this mission must be modified to the language and needs of the end-users, and therefore transferred to the users' motives. For example, a system's mission to restructure a company will become visible, touchable, and relevant if it is broken down into sub-goals for the users such as making their concrete tasks easier, improving the quality of report generation, and speeding up information searching.

It is also important to fulfil another precondition: task interdependence must be settled and clarified in advance. The introduction of technology should only start once there is a clear picture about all the job processes that are to be automated. In practice, we saw that managers realised the importance of task operationalisation rather late–when users could not overcome their difficulties with the system–and so we would emphasise this precondition. On the one hand, we saw that there is a need to have strong task interdependence in order to develop group learning but, on the other, we

observed that a very high level of task interdependence can complicate IT implementation. Such 'duality' calls for careful attention from the managers: job tasks and their interdependence lines must be clearly operationalised and communicated with the users before the introduction of the system.

When these conditions are met, it is time to think about further project management support.

Only with the implementation of Beaufort for the PSA group did we see strong support given to the users by the project team. The other case studies showed a lack of beneficial managerial support. For example, in the KennisNet implementation, after the system was introduced to the targeted employees, there was a lack of progress or dynamics in the educational and training possibilities, in the feedback given to the users, and in discussions. All we observed was a couple of workshops in which the users were asked to operate the system. During the Beaufort implementation for the decentralised users, employees were left to their own devices and struggled with the system: the management had hoped, based on the PSA experience, that use would develop routinely.

Our findings suggest that the main thrust of managerial support for the implementation of collaborative technologies should be in promoting group interaction processes in the direction of adopting the system. We observed a number of good practices in the three cases that did stimulate constructive group learning. These were:

- Having a help desk or front/back office service on system functionality available for the users at any time,
- Creating and distributing a list of experts on the system's functionality within the group (usually these were the advanced users among the targeted employees whose experience can be very helpful to others),
- Introducing an e-mailing list that includes all the users (or setting up a hot-line chatroom),
- Scheduling informal meetings (such as coffee breaks) for the group of users,
- Agreeing how to involve new employees in the use of the system (what to explain to them, who is responsible, etc.),
- Distributing special notebooks for ideas, proposals, and complaints amongst the users,
- Collecting the proposals that come from the users and reacting to them (negotiating),
- Organising regular evaluation sessions with the users about progress in the project.

This list is not exhaustive, it includes only those practices we saw in real projects: in the implementation of Beaufort for the PSA group, and in the later stages of the SAP_HR implementation. Further, we observed that these practices advanced group learning in the 'right' direction.

The findings from the case studies have clarified our theoretical ideas about managerial support. Following the empirical research, we believe the following three issues are of vital importance: (1) providing the end-users with the responsibility for decision-making in their work with a newly introduced technology, (2) promoting

formal and informal learning possibilities, and (3) recognising progress in operating with the system.

We saw that in those case studies where the users were authorised to take decisions, group learning progressed faster. For example, in the PSA group, the users were encouraged to develop proposals on how to improve the use of Beaufort, and they came up with ideas of dividing tasks in the Informer module. In AcademCentre, the heads of the personnel departments took the decision to limit the access hours for clients in order to provide additional time for the adoption of SAP_HR. However, we would caution that giving responsibilities to the end-users may also hamper the implementation as we saw in the use of Beaufort by the decentralised users.

Promoting learning possibilities is directly related to group learning as it provides the basis for knowledge and skills exchange. However, the findings show that only 'customised', user-centred, learning opportunities lead to an improvement in group learning. In our view, users do not need the standard large technical manuals that resemble telephone guides. Rather, the users need task-based, job-related manuals on *why*, *when*, and *how* they should use the various services (modules) in the system. The same holds true for the standardised instruction sessions often provided to the users long before they actually work with the system. Training should be designed on the basis of the concrete tasks of the users, with examples from their own work situations, and provided just-in-time when they are required to complete a task.

In all the case studies, we observed a lack of constructive, thoughtful feedback to the users from the project leaders. Mostly, the feedback only concerned emergency situations when the users made mistakes in operating the system. Further, efforts made to learn the system, and overcome initial difficulties in getting used to it, were not recognised. All the interviewees emphasised the importance of recognition for their efforts in learning and working with the new technology.

If we were to advise a management style for those responsible, we would suggest that they remain constantly 'on duty' during the implementation, and keep an eye on the group learning processes to ensure that these develop in the right direction, and that users discuss how to improve the usage of the system rather than how to terminate it. If group learning develops impulsively, the adoption of IT may result in complications and high risks for a project as a whole. Hence, a failure to steer group learning will increase the threat to implementation if an organisation approaches a critical moment when a decision has to be taken as to what should be done in order to keep the implementation on track (as was seen with the Beaufort implementation for the decentralised users).

A question that arises is what to do if the group learning processes are already causing the project to implode. The decentralised users in Medinet, having full decision-making freedom, determined to, and succeeded in, closing the project. At this stage, it was probably already too late to capture group learning and redirect it. Another example, the implementation of SAP_HR, illustrated another way to deal with the 'spark' of rebellion. The implementation was forced: the users were not given a choice, and this led to a long, complicated, but ultimately 'successful' implementation of the technology.

Refining the Managerial Support construct in the research model

After each case study, we refined the content of the dimensions in the managerial support construct of the research model. In this section, we finalise the revision of the components of this construct based on their relevancy. The analysis is again similar to the one used to refine the group learning construct and, therefore, we proceed immediately to the results.

The cross-case analysis has shown that:

- Three components did not get support in all of the three case studies, and have therefore been removed from the research model. These were: 'consultations and informal learning', 'having time to discuss the technology', and 'managers' time allocated for end-users to discuss implementation issues'.
- Two components received sufficient empirical support in only one or two of the cases, and so were retained in the final model but only as contextually important: 'freedom in use of IT' and 'authority in planning work with the system'.
- The remaining components were retained.

7.5 REFLECTIONS ON THE RESEARCH METHODOLOGY

Our research is based on the idea that the human minds create the meaning of the social reality, in this instance the implementation of information technologies. This acceptance of constructivism leads to a belief that a value-neutral description of the social world is impossible, and every research activity shapes the reality it researches. This approach corresponds fully with the theory of experiential learning that we applied to IT implementation. Constructivism as a theory of learning in our research represents the idea that learners–users of the systems–do not accept the 'right' implementation of technologies as offered by the managers and project leaders, but actively construct the implementation process through their own learning experiences.

In our view, the strength of the approach presented in this thesis is that it emphasises collaboration, which will always be constructive because communication is stressed as the key factor for the creation of reality.

We have selected and then elaborated on the method known as discourse analysis. Chapter 3 contains a detailed discussion, and the purpose of this section is to reflect on the value of the method in our research situation. Given the abstract character of the method, and the vast array of alternative well-established research methods, why should anyone adopt discourse analysis for IT research? Following the views of Philips and Hardy (2002), we can expect some readers to come up with arguments why *not* to adopt it (and leave the method to linguistic specialists). Firstly, one can argue that any new technique requires time to master, especially if the literature does not provide clear guidelines. Newcomers to discourse analysis discover a vast array of philosophical-sociological-linguistic discussions, but a shortage of clear procedures. Secondly, new methods take a long time to gain acceptance and become institutionalised in a research community. Discourse analysis is no exception: researchers face huge barriers if they attempt to publish studies based on discourse analysis, although we would stress that IT studies are beginning to recognise discourse

analysis as an option. Thirdly, the method is highly labour intensive and time consuming. Giving the above reasons, and the relentless pressure to 'publish or perish' in academia, many will opt for the more well-known and quicker, less labour intensive research methods.

However, we believed that there were solid benefits which increased the relevance of discourse analysis in the IT field and thus could advance our study. In our view, these reasons outweighed the disadvantages and steered us towards this method.

The most attractive feature of discourse analysis is that it provides a way to uncover the dynamic reality of IT implementation, and its use in companies, by examining real 'stories', expressions, statements–that is the written and spoken opinions of those who are, in our view, responsible for the IT implementation. The subject matter of the discourse analysis involves the real social life of organisations. By using contextual knowledge, text, and discourse we can link the various social events that mutually support the research idea, i.e. the method captures a community understanding of an IT phenomenon.

Secondly, the approach challenges the researcher, and requires creativity, increased reflexivity, and improvisation. It pushes the researchers to think more about their research practices and findings. Coming up with research questions, finding a site, collecting data, conducting interviews, talking with different people, analysing everything you heard, read, and saw–and writing it up–requires creativity and improvisation. Considering the constructive character of language, the discourse is both constructive of the social world and constructed by and within it. The challenge for a researcher is to understand (interpret) the meaning of IT issues (design, use, implementation) covered by a text. This is to be achieved by exploring the interplay between text (linguistic features), discourse (set of texts), and context. Through analysing discourse, the researcher intervenes between the past and the present meaning, and translates the social events into a form that is comprehensible to the 'owners' of the discourse.

A discourse analysis is open to multiple interpretations, and also to new contexts which might cause the results to change. How then does one respond to a critic who does not agree with one's interpretations? We agree with Lee (1999, p. 21), who argues that when we are reading, the responsibility is on us to understand the text. Likewise, if a critic is reviewing our interpretations, it is their responsibility to reach an understanding of our interpretations. The ways in which we have arrived at the results are transparent. The scientific value is enhanced by the inter-subjective validity that is achieved from the various interplays: between open-ended interpretations and their transparency; between individual and other texts, between single- and multiple-level interpretations within one discourse set, between texts and contexts, and between the interpretive and the explanatory nature of the analysis. In other words, the trustworthiness of a discursive-based study can be assessed.

7.6 THE FINAL CONCEPT OF IT IMPLEMENTATION AS GROUP LEARNING

There is no unique way of designing an information system, there is no unique way of interpreting it, and further there is no unique way of implementing it. Organisational, cultural, political, and other conditions shape the norms and values of a social group which, in turn, influence the meaning given to the technology. Interpretive flexibility of technology, which highlights the multiplicity of ways to understand it, leads to interpretive flexibility in its implementation. Therefore, different groups of users, under different circumstances, *will* adopt the same information technology differently.

In our research, we considered group learning as a mechanism that influences the adoption of a new system by a group of users. This mechanism involves various interaction processes that reassign the group meaning of the IT. The mechanism also links the meaning of the IT to the action of operating the system. Therefore, it catches the dynamics of IT implementation and enables them to be steered.

This approach provides a lens through which an IT implementation can be viewed. It helps to overcome some of the potential difficulties by questioning and reconsidering the 'certainties' in IT studies.

The social group is at the heart of the implementation; it constructs the implementation and carries the responsibility for achieving the stable use of a technology. However, the social group is not isolated within an organisation and, therefore, its construction of the implementation processes is created through the interplays between individuals and the work environment, the self and the organisation, and the self and other groups. Group learning will take a constructive direction provided certain preconditions and project management activities are fulfilled.

We consider that there are two preconditions that will enhance group learning:

(1) Provided a new technology shows its immediate value for the job tasks of the employees and ease-of-use, then the group learning will multiply the positive ideas about the IT, the job relevance of the system will be increased, and there is a real chance that the technology will be appreciated and implemented more quickly.

(2) If the tasks to be automated are interdependent in a sequential, balanced, reciprocal, or associated manner, then the employees will start to build a group. This is a structurally necessary condition for group learning to advance.

Managerial support needs to first accept the dynamic and complex character of the IT implementation process. Secondly, IT leaders should acknowledge the importance of the group essence in this process since this directs the group acceptance of a technology. Thirdly, managers should ensure that the two preconditions detailed above are met before a system goes live. Finally, there are tactics that can be used to promote the 'appropriate' group learning.

We have combined these conclusions into one view to create a symbolic picture of how we see IT implementation as a group learning process (Figure 7.1). The components in the constructs have been refined on the basis of the discourse analysis

as explained earlier. Some of the components (shown in italics) were labelled as contextually important because they only appeared to be relevant in some case studies, whereas the others were found in all the situations investigated.

The twelve arrows in the figure represent the following influences which were observable in the case studies:

1. Technology requires and provides the basis for collaboration in a group of users in line with the supported task interdependencies; the technology should also offer services to address the users' job needs.
2. Users may end up as servants of the system if it creates many changes in their job tasks and they do not feel immediate benefits.
3. Technology addresses job relevance issues that give the initial direction to the group learning processes.
4. A group of users develops interpretive schemes about the technology through the group learning processes, and therefore technology becomes even 'more' or 'less' relevant, in users' opinions during the implementation process.
5. Development of structural and non-structural group characteristics influences group learning. While structural characteristics affect more the knowledge acquisition processes; non-structural characteristics influence more the knowledge transformation processes.
6. Development of group learning contributes to the development of such characteristics of a group of users like trust, knowing each other, and psychological safety.
7. Managerial support influences group characteristics in IT implementation through arranging team building activities and dividing job tasks that are to be automated with the help of the information system.
8. Job tasks and their interdependence in a group of users, if not operationalised before the introduction of the technology, will demand changes in the managerial practices during the implementation traject.
9. Managerial support influences group learning by delivering responsibilities in the IT project to the end-users, by supporting a range of learning opportunities, by organising group discussions and evaluation sessions, and by giving feedback on the IT implementation to the users.
10. Group learning provides a feedback loop to the management support for the IT implementation that has to be settled before the system goes live.
11. Group learning may speed up or slow down the implementation process through the development of the five processes.
12. Created group's perceptions about usefulness of the technology and its ease-of-use–influence group interactional processes, for example by affecting understanding of IT by newcomers in a group.

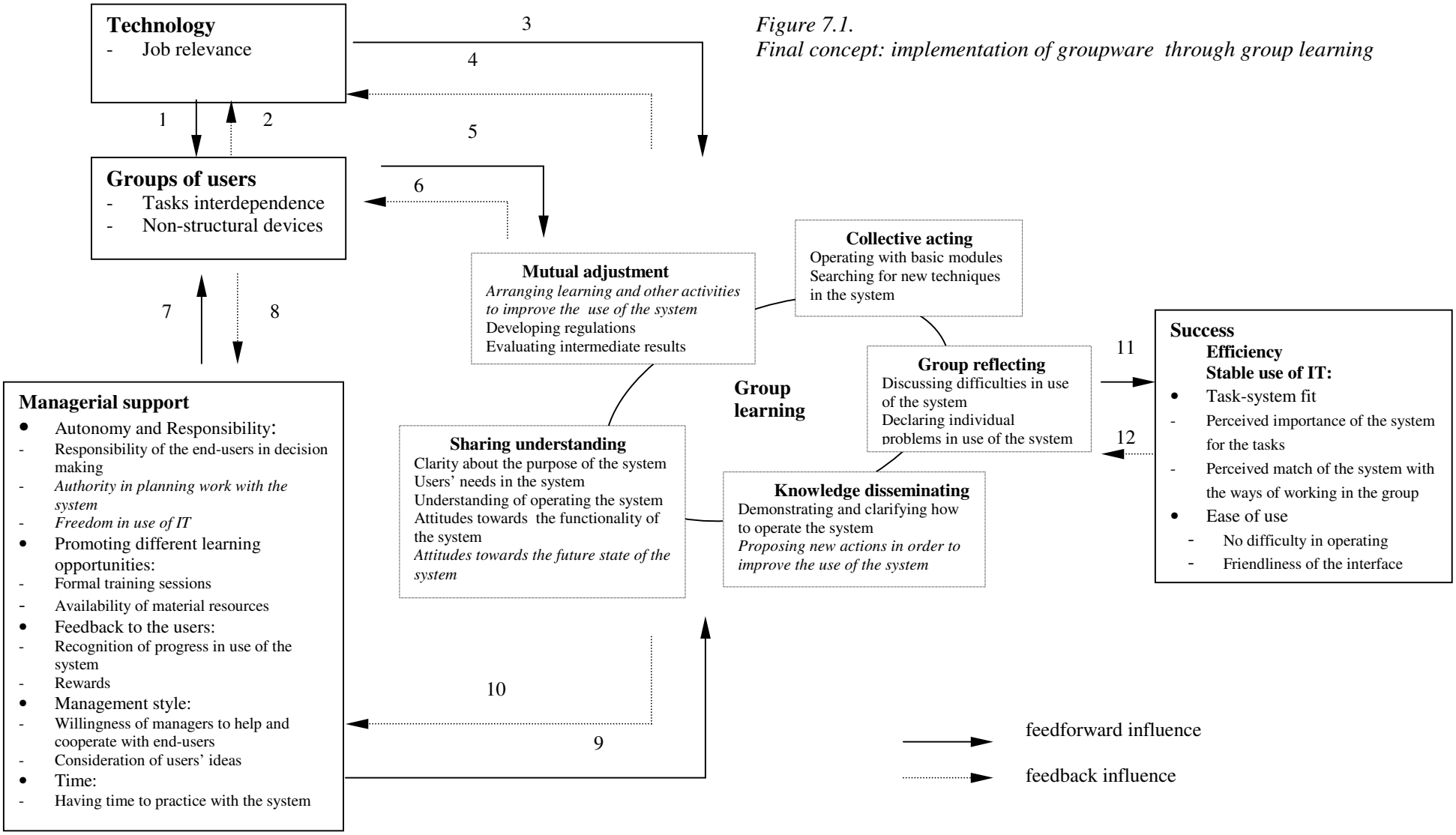


Figure 7.1.
Final concept: implementation of groupware through group learning

7.7 DIRECTIONS FOR FUTURE RESEARCH

Given the range of topics discussed, there are quite a number of issues that call for further research. We will address what we see as the most urgent points in six issues.

1. The distinction found between *stabilisation* of technology and the *stable use* of technology supports the suggestion by Orlikowski (2000) that researchers, and those measuring return on investment in terms of technological investment, may get more insights if they look at the returns on the *use of technology* by the targeted employees. The most advanced software programmes cannot increase employees' performance on their own–only their use can. We have shown that how people communicate about a technology has implications for how they perceive it, how they develop meanings about it, and how they work with it. However, we continue with Orlikowski's suggestion by proposing that it is not enough to explore only how people interact with *technology* since this might miss a crucial point–that is how and what users communicate *with each other* regarding the technology. A knowledge of what is actually communicated about a technology amongst the users might provide further insights into why organisations experience different outcomes from their investments in the same type of technology since the effectiveness is dependent upon how, when, and why the targeted employees adopt a system through their interaction processes.

2. We have observed conditions that are necessary for group learning to take place such as task interdependence, trust in groups, and certain project management activities. However, to stop at this point misses an important aspect of organisational life. The employees studied (users of technology) went to work and did what they had to do to get their usual jobs done. Their leaders, departments, and the corporate culture, all essential ingredients, were excluded from this research in order to keep the focus on the group and project level. However, further research could greatly contribute to the understanding of the origins and differences in group learning by taking into account different work environments. We suggest that insights could be gained by exploring IT implementation in different types of work and work environments (such as process-, product-, and logistics- based work, and administrative work). Determining whether there is a link between the type of work environment and the type of organisation, and group learning in IT implementation, would add to our research findings.

3. The next topic considered for future research is project management. Two issues can be mentioned here. Firstly, our observations show that project management plans tend to be relatively straightforward and based on linear tactics. These tactics seem to lack space for the social dynamic processes that occur during IT implementation, although the project leaders studied did show an understanding and respect of the social issues. Maybe they simply lacked adequate project management tools? Thus, we suggest focussing research on further developing 'dynamic' project management tools that could cope with the complexity of socio-technical developments during the implementation process. Secondly, within project management activities, research attention should be directed towards providing learner-centred learning opportunities. Our findings have shown that organisations prefer to apply standard packages to instruct future users such as a couple of trainings sessions and manuals. Our results have shown that such neutral education does not provide users with an adequate understanding of the technology. A new study should address such issues as the analysis and design of a sequence that would support learning content, needs-based instructional designs, choosing an appropriate instructional medium (training courses for particular users, specification of standard manuals, interactive on-line courses), and an assessment of the effectiveness of training sessions.

4. Another issue requiring research is what Markus (2004) calls “technochange management”. Technochange is argued to be the situation in a company when a new information technology is introduced with a high likelihood of making significant transformations in people’s work, business processes, and organisational performance. Perhaps it is no longer sufficient to lecture that organisational change cannot be achieved by the introduction of information technology, and it is time to acknowledge that organisations continually introduce IT in order to change their work and business processes. Therefore, there is a need to look for new approaches that are able to integrate two usually opposing strategies: IT projects and organisational change programmes.

We agree with Markus (2004) that by treating technochange situations as if they were only technical or only organisational change projects, “the organisations risk being blindsided by IT implementation problems and unintended consequences” (p.5). Treating technochange situations as only IT projects does not work because this fails to control such important issues as preparing future users to work with the technology, resistance to use, and misuse or non-use of a system. As we have seen in the Beaufort implementation, a coordinated HR restructuring process required not just new software but also decentralised users willing to collaborate with each other. In the best scenario, it took time for the employees to agree to change their ways of working. In the worst case scenario, employees did not agree to this because they did not see benefits in having overviews of sick leave or functional talks in the company; on the contrary, they felt that the new way of working conflicted with the traditional reward system in Medinet. However, we would say that treating technochange situations exclusively as organisational change fails to control for other issues such as the functionality of a technology in terms of meeting users’ needs, technical testing, installation, and the conversion of data. We have seen in the SAP_HR implementation that the organisation failed to convert its data from the old system to the new one, and this delayed the creation of technical feedback reports for the users.

5. Our observations have shown that the monitoring, controlling, and managing of IT implementations were dominated by IT specialists and system administrators, whereas the organisations’ managers were predominantly involved during the initiation stage to approve the project and provide funding. However, we did not observe the appropriate design of new jobs associated with a new technology, adequate and needs-based training for future users, restructuring of an organisations’ units, changes in HR policies (hiring specialists, new compensation or performance evaluation based on work with the new IT), or any reallocation of resources. Such practices are usually related to personnel policies and carried out by personnel professionals. Based on this view, we propose investigating the possibilities of integrating two approaches: an IT project approach, and organisational change programmes including HR policies for the specific aspects of IT implementation. Such integration would, we believe, advance a fit among the prior intentions of information technology, the strategies and tactics, the individual users’ needs in it, and the adoption of IT by the users.

6. The methodology used in this study also calls for further research. First of all, we see a need for further development if we are to understand the new organisational dynamics. Some specific topics within discourse analysis deserve attention. Researchers should remember that language constructs, rather than reveals, reality. It would be interesting to ground research in historical processes in order to understand how things come to be the way they are. Secondly, researchers could allow other voices to spread through the text including those who are normally silent. It seems that more needs to be done in order to develop clear guidelines for employing the three-level concept (text, discourse, context) since this is often reduced to a two-level analysis linking only text and context. There is nothing wrong per se in this approach, but it removes the uniqueness of the method and makes it identical to other methods of text analysis. When appropriate guidelines are established, it will become easier to conduct studies, to finalise results, to summarise conclusions, and to get such research published.

8. SUMMARY

This thesis is about the influence of group interactional processes on the implementation of information technologies. The starting point of this research is the belief that it is neither the quality of the technology, nor that of the individual users, but the interactions among people in groups of users concerning a new system that determines the success or otherwise of IT implementation. This study specifically focuses, firstly, on that part of the implementation trajectory that starts as the technology goes live, and lasts until it is successfully being used by the targeted employees; and secondly on a specific type of information technology that supports collaboration, the so-called groupware systems.

Aiming to build a theoretical understanding of IT implementation through group learning, this thesis has strived to conceptualise how groups of users constitute their work with a newly introduced information technology. The main research question was formulated as what is the role of group learning in the implementation of groupware by groups of users from its technical installation until its successful use. This question guided the research trajectory and geared it to the conclusions and reflection upon this thesis's importance.

The main contribution of this thesis is twofold. First, a novel lens for looking at IT implementation is introduced: IT implementation is conceptualised as a group learning process. Second, practical guidelines for conducting discourse analysis in IT research, as a method to capture the dynamic character of the interactional process in a group of IT users, are conceptualised and developed.

It is not this thesis's claim, however, that all the problems in IT projects can be resolved through group learning. Rather, the purpose is to show that group learning can become a 'hidden' mechanism for speeding up, or slowing down, IT implementation, or even for the termination of an IT project.

It is shown that if a group of users appreciates the technological help provided for their tasks, share positive attitudes, and attribute growth in performance to the technology then, in such a scenario, people learn the relevant issues linked to a technology. In so doing, the system is 'discovered', 'studied', and better understood: and, with this, the technology becomes more relevant for the job tasks and easier to work with. This leads to a better and quicker acceptance of the technology by the users. The opposite scenario is when the users, together, only complain about the system, perceive it negatively, and convince each other of its uselessness. They collectively harden their negative views about the relevance of the system for their tasks and see the technology as too complex to operate. Thus, the technology becomes 'even less relevant' for the job in the opinions of the users, and they learn things that do not motivate them to accept the system.

Having recognised the importance of group learning in IT implementation, it is argued that it is vitally important that those who are responsible for IT projects stress and accept its role. If managers do attempt to advance group learning, then it might become a catalyst for a successful project. If not, group learning might initiate an impulsive and unpredictable development that, in the end, might harm the project.

In order to conceptualise the role of group learning in groupware implementation, a discourse analysis method was developed that uncovers the interactional processes among the users during IT implementation. This method is an appropriate means for studying enacted IT implementation

because, through the deep analysis of texts, discourses and contexts, it allows one to uncover human-human interactions during IT implementation and to link them with the contextual developments in IT projects.

Below, the main conclusions from the essence of this research will be summarised as the contents of the thesis are outlined.

In Chapter 2, the theoretical foundations of this study are investigated. The goal of this chapter was to build a preliminary research model that conceptualises IT implementation through group learning. The chapter shows the gradual structuring of the model through constructs: characteristics of groupware technologies, understanding of IT implementation, group learning processes, and conditions for group learning – group characteristics and managerial support.

Following on from the ideas of Ellis and Wainer (1994), Dale (1994), Mark and Wulf (1999), and others, the conceptual characteristics of groupware technologies are discussed. This led to the understanding of groupware as being collaborative software packages and fragments (traditional or embedded in more complex systems) that enable collaboration among users. Three technological features are considered as important for groupware implementation: the role of the technology in a company, its specification, and enabling collaboration.

Next, a comprehensive overview of IT implementation concepts (divided into 'soft' and 'hard' studies) led to the standpoint for this research that would be based on the 'soft' tradition: considering IT implementation as a dynamic and unpredictable process. Following from this, the research goes on to look at how people develop their work with a technology through their interactions, discussions, talks and sharing experiences about it. Through this, a group essence is introduced in IT implementation that reflects how groups of users, through processes of negotiation, develop common interpretive schemes about the IT they use. This allows one to define the implementation process as complete once groups of users work with the technology in a stable way, that is skilfully and task-consistently.

Following this, the concept of group learning – the heart of the thesis – is developed, and is defined as all the interactional processes in a group through which group members develop their interpretive schemes about a newly introduced technology, and that help them to adopt it. Following from the work by Kolb (1984) on experiential learning, the group experiential learning cycle is conceptualised as having five steps:

- Collective acting - the task-related operations with the system undertaken by members of a group.
- Group reflecting - the communication upon the extent to which the system supports the performance of tasks.
- Knowledge disseminating – behaviour by group members that aims to externalise ideas about the system in order to improve its usage.
- Sharing understanding – creating a common meaning of the system regarding its role and its functionality.
- Mutual adjustment – activities that aim to reach collective agreements on the use of the system in a group.

Two sets of conditions that steer group learning are considered: group characteristics and managerial support practices. Group characteristics include structural and non-structural features of user groups and the software experience of the users. Managerial support practices take account of the autonomy and responsibility given to the users during the IT implementation, a range of learning opportunities open to the users, any feedback and reward systems during the IT project, and time given to learn and practice with the technology.
The chapter is finalised, in line with its goal, by placing all the developed constructs in a combined view - the preliminary research model.

Chapter 3 presents the development of the discourse analysis: the interpretive analytical method that allows one to uncover the enacted process of IT implementation. This method, although not widely accepted in IT studies due to its complexity, is viewed in this thesis as the appropriate method for conceptualising group learning. It is understood as the methodological application of the hermeneutical circle that combines the features of individual texts, as units of research, and open constructive interpretation of sets of texts, as the whole phenomenon.

It is shown that discourse, defined as sets of texts, always lags behind the real intentions of what one wants to, or has to, express. Through analysing discourse, therefore, the researcher intervenes between the past and the present meanings in order to interpret the meaning covered by a text. It is shown that the scientific value of the method is supported by the intersubjective validity; this being the endless openness between interpretations and their transparency, between single and multiple interpretations, and between texts and contexts.

There is a wide diversity in the practical application of discourse analysis, and this study is based on the interpretive structuralist approach to discourse analysis (Phillips and Hardy, 2002). The chapter contains practical guidelines on carrying out discourse analysis that includes the following eight steps: identifying a theory and the role of researcher, operationalisation, sampling, conducting interviews, transcription, member check, analysis, and debriefing. All the steps have specific characteristics, for example interviews becomes crucially different to traditional interviews if a researcher performs these as part of discourse analysis. The goal becomes more complex: obtaining both consistency and variety as against looking only for consistency. Therefore, the techniques to be used are different and oriented towards supporting diversity through the active intervention of the interviewer, asking provocative questions, and facilitating disagreements.

The data collected during the case studies, for discourse analysis, were aimed at:
- exemplifying the theoretical discussion advanced in Chapter 2;
- clarifying the contents of the constructs in the preliminary research model;
- refining the research model.

Chapters 4, 5, and 6 describe the implementation of appropriate IT systems: (a) Beaufort in the large hospital Medinet, (b) KennisNet in the insurance organisation InsurOrg, and (c) SAP_HR in the educational institution AcademCentre. The three case studies took about six-ten months each to complete, the data was collected by means of qualitative methods such as in-depth interviews, document analysis, and observation; and the transcripts were analysed using discourse analysis. The findings are presented as discourses covering constructs from the research model, namely: group learning, managerial support, and stable use of technology. After each case study, the process of IT implementation through group learning is analysed and the research model further refined. Results from these refinements are used to improve the final concept of IT implementation through group learning.

Chapter 7 contains the reflections on and conclusion drawn from the research, subdivided into conclusions on group learning in IT implementation, and conditions for its constructive development. The chapter addresses the research questions, stressing the role of group learning in the implementation of groupware by groups of users.

On the concept of group learning there are seven important conclusions.

- Group learning emerges immediately after a new system is introduced to the targeted networked users. As soon as they have the opportunity to operate it, the users begin to talk about the system, spread their interpretations of it, and joke about it; or ignore it, complain to each other, and blame the system.
- Group learning may take various directions from the very beginning: for or against adoption of the system. The initial direction is provoked by: (1) the usefulness of the

technology for the job tasks, and (2) the clarity of the tasks to be automated. These observations support findings elsewhere (Davis et al., 1989; Joshi, 1991; Adams et al., 1992; Morris and Venkatesh, 2000; Venkantesh, 2000; Brown et al., 2002). An added value of this research is the observation that the usefulness of the technology steers the initial direction of the group learning processes. At the same time, the usefulness of the technology develops due to developments in group learning.

- Group learning develops during the implementation process but can either progress or take a turn for the worse.
- One of the 'learning' results of group learning in IT implementation is the development of interpretive schemes about the technology. Group interaction processes in IT implementation 'supervise' the process of changing users' knowledge, skills, and attitudes about IT. The result is that a group is more than the sum of its parts; all employees have the potential to work with the system at a higher level than they would ever achieve individually. Thus, through group learning, employees can more quickly achieve a full understanding of the technological services offered by a system and exploit them to the maximum.
- Group learning has the potential to speed up or slow down the IT implementation process. A positive development in group learning will signal quicker progress that will positively influence interpretations of the technology and lead to constructive action – a quicker acceptance of it.
- Most progress/regression in group learning was observed during the knowledge acquisition processes and less in the knowledge transformation processes. During the first one to two months of the implementation process, managers would recognise signs of positive development in the knowledge acquisition dimension of group learning as: growing intensity of working with the basic services offered by the system; increasing activities involving searching for new possibilities in the system; an increasing number of proposals for improvements to the system and its implementation; improving conceptual understanding of the technology; and discovering, recognising, and acknowledging individual user needs in the technology. Signs of negative development in the knowledge acquisition dimension in group learning would be: a decline in operating with the basic modules; a disruption in the flow of new ideas for improving the technology and its implementation; expressing negative attitudes towards the system's functionality; and users' doubting their need for the technology.
- The development of the knowledge acquisition processes was promoted by structural arrangements in the user groups and, in practice, this took less effort than the promotion of knowledge transformation processes. The group reflecting and mutual adjustment processes were related to the non-structural characteristics of the group such as psychological safety, knowing each other, trust, and experience of working together. These devices take more time and effort to establish in new groups of users, and therefore the knowledge transformation processes develop more slowly in new groups.

Conclusions about the conditions for group learning in IT projects can be combined with recommendations to steer constructive group learning and summarised in the following statements:

The findings suggest that the main thrust of managerial support in the implementation of collaborative technologies should be in promoting group interaction processes in the direction of adopting the system. Having acknowledged the importance of complicating circumstances faced by IT project teams during IT implementation, such as budget limitations, agreements with consultancy firms, and the technological infrastructure, our research suggests that project leaders

still should not ignore the interaction processes among the users that can either speed up or harm the implementation.

Before introducing a system, it is crucial to conceptualise its importance for the users, and to convince them of its relevance on two levels: a high-level strategic mission, and meeting the concrete needs of the end-users. It is also important to fulfil another precondition: task interdependence must be settled and clarified in advance.

Following from the empirical research, three issues are proposed in order to keep group learning alive: giving end-users responsibility for decision-making in their work with a newly introduced technology, promoting formal and informal learning possibilities, and recognising progress in operating a technology. A number of good practices were observed in the three case studies that did stimulate constructive group learning: having a help desk on system functionality available for the users at any time, distributing a list of experts on the system's functionality within the group, and introducing an e-mailing list that includes all the users.

Chapter 7 concludes with the final concept of groupware implementation through group learning. The components in the constructs have been refined following the discourse analysis explained earlier. Group learning is revealed to be a mechanism that influences the adoption of a new technology by a group of users. This mechanism involves various interactional processes that reassign the group meaning of the IT. The mechanism links the meaning of the IT to the actions in operating the system. This approach helps to overcome some of the potential difficulties by questioning and reconsidering the 'certainties' in IT studies.

9. REFERENCES

Adams, D.A., Nelson, R.R., & Todd, P.A. (1992). Perceived usefulness, ease of use and usage of information technology: a replication. *MIS Quarterly*, 16, (2), 227–247.

Ahn, J., & Skudlark, A.E. (1997). Resolving conflicts of interests in the process of information system implementation for advanced telecommunication services. *Journal of Information Technology*, 12, (1), 3–14.

Agar, M. (1986). *Speaking of ethnography*. Qualitative Research Methods Series. No.2. London: Sage.

Akgün, A.E., Lynn, G.S., & Reilly, R. (2002). Multi-dimensionality of learning in new product development teams. *European Journal of Innovation Management*, 5, (2), 57–72.

Akrich, M. (1992). The de-scription of technical objects. In: Bijker, W.A., & Law, J. (Eds.), *Shaping technology / Building society: Studies in sociotechnical change* (pp. 205–224). Cambridge, MA: MIT Press.

Allard, M. (1998). Overcoming cultural barriers to the adoption of object technology. *Information Systems Managemen*t, 15, (3), 82–113.

Allinson, C.W., & Hayes, J. (2000). Cross-national differences in cognitive style: implications for management. *International Journal of Human Resource Management*, 11, (1), 161–170.

Ang, K.-T., Thong, J.Y.L., & Yap, C.-S. (1997). IT implementation through the lens of organizational learning: a case study of INSUROR. In: K. Kumar and J.I. DeGross (Eds.), *Proceedings of the 18th International Conference on Information Systems (ICIS'97).* December, 15–17, Atlanta, Georgia, 331–348.

Alavi, M., & Joachimsthaler, E.A. (1992). Revisiting DSS implementation research: a meta-analysis of the literature and suggestions for researchers. *MIS Quarterly/* March 1992, 95–113.

Alvesson, M., & Karreman, D. (2000). Varieties of discourse: on the study of organizations through discourse analysis. *Human Relations*, 53, (9), 1125–1149.

Arkich, M. (1992). The de-scription of technical artifacts. In: W.E.Bijker and J. Law (Eds.), *Shaping technology/ building society* (pp. 205–224). Cambridge, MA: MIT Press.

Argyris, C, & Schön, D. (1978). *Organisational learning: a theory of action perspective*. Massachusetts: Addison-Wesley.

Atkinson, P., & Hammersley, M. (1994). Ethnography and participant observation. In: N.K. Denzin and Y.S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 248–261). CA: Thousand Oak , Sage.

Avison, D.E., & Fitzerald, G. (1999). Information systems development. In: W.L. Currie and B. Galliers (Eds.), *Rethinking management information systems* (pp. 250–278). Oxford University Press,.

Badham, R., Garrety, K., & Kirsch, C. (2001). Humanistic redesign and technological politics in organisations. *Journal of Organisational change*, 14, (1), 50–63.

Baecker, R.M. (Eds.) (1993). *Readings in Groupware and Computer-Suppored Cooperative Work: Assisting Human-Human Collaboration.* San Mateo, CA: Morgan Kaufman.

Bardram, J. (1998). Designing for the Dynamics of Cooperative Work Activities. In: *Proceedings ACM 1998 Conference on Computer Supported Cooperative Work (CSCW'98).* November, 14–18, Seattle, WA, USA: ACM Press, 89–98.

Barley, S.R. (1986). Technology as an occasion for structuring: Evidence from observation of CT scanners and the social order of radiology departments. *Administrative Science Quarterly*, 31, 78–108.

Barley, S.R. (1990). The alignment of technology and structure through roles and networks. *Administrative Science Quarterly*, 35, (1), 61–103.

Barkhi, R. (2002). Cognitive style may mitigate the impact of communication mode. *Information and Management*, 39, (8), 677–688.

Barki, H., & Hartwick, J. (1994). Measuring user participation, user involvement, and user attitude. *MIS Quarterly*, March 1994, 59–83.

Baronas, A.-M. K., & Louis, M.R. (1988). Restoring a sense of control during implementation: how user involvement leads to system acceptance. *MIS Quarterly/* March 1988, 111–123.

Baroudi, J.J., Olson, M.H., & Ives, B. (1986). An empirical study of the impact of user involvement on system usage and user satisfaction. *Communications of the ACM*, 29, (3), 232–238.

Barret, M., & Walsham, G. (1995). Managing IT for business innovation: issues of culture, learning and leadership in a Jamaican Insurance Company. *Journal of Global Information Management*, 3, (3), 25–33.

Baskerville, R., & Pries-Heje, J. (1999). Grounded action research: a method for understanding IT in practice. *Accounting, Management and Information Technologies,* 9, (1), 1-23.

Beck, L.L., & Perkins, T.E. (1983). A survey of software engineering practice: tools, methods, and results. *IEEE Transactions on Software Engineering*, SE-9, 5, September, 541–561.

Bell, D., & Johnson, P. (1996). A contingency model for groupware design. In: D. Shapiro, M. Tauber and R.Traunmuller (Eds.), *The design of computer supported co-operative work and groupware systems*. Elsevier: Amsterdam.

Benbasat, I., & Lim, L.-H. (1993). The effects of group, task, context, and technology variables on the usefulness of group support systems. *Small Group Research*, 24, (4), 430–462.

Benbasat, I., & Taylor, R.N. (1978). The impact of cognitive styles on information systems design. *MIS Quarterly*, 2, (2), 43–54.

Bergeron, F., Raymond, L., & Rivard, S. (2001). Fit in strategic information technology management research: an empirical comparison of perspectives. *Omega-International Journal of Management Science*, 29, 125–142.

Bijker, W.A. (1992). The social construction of fluorescent lighting, or how an artifact was invented in its diffusion stage. In: W.E. Bijker and J. Law (Eds.), *Shaping technology / Building society: Studies in sociotechnical change* (pp. 75–104). Cambridge, MA: MIT Press.

Bijker, W.A., & Law, J. (1992) (Eds.), *Shaping technology / Building society: Studies in sociotechnical change*. Cambridge, MA: MIT Press.

Bikson, T.K., & Eveland, J.D. (1996). Groupware implementation: reinvention in the sociotechnical frame. In: *Proceedings ACM 1996 Conference on Computer Supported Cooperative Work (CSCW' 96)*. November, 16–20, Cambridge MA USA: ACM Press, 428–437.

Bikson, T., & Gutek, B. (1984). *Implementation of office automation*. Santa Monica, California: Rand Corporation.

Block, R. (1983). *The politics of projects*. New York: Yourdon Press.

Bloomfield, B.P., Coombs, R., Cooper, D.J., & Rea, D. (1992). Machines and manoeuvres: responsibility accounting and the construction of hospital information systems. *Accounting, Management & Information Technology*, 2, (4), 197–219.

Bondarouk, T., & Sikkel, K. (2003). Explaining groupware implementation through group learning. In: M. Kosrow-Pour (Eds.), *Proceedings of the 14th Information Resource Management Association International Conference (IRMA'03).* May, 18–21, Philadelphia, PA: Idea Group Publishing, Hershey, 463–466.

Bowker, G., Timmermans, S., & Star, S.L. (1995). Infrastructure and Organizational Transformation: Classifying Nurses' Work, In: W. Orlikowski, G. Walsham, M. Jones, and J.D. DeGross (Eds.), *Information Technology and Changes in Organizational Work* (pp. 344–370). London: Chapman and Hall.

Brown, A.D., & Starkey, K. (1994). The effect of organizational culture on communication and information. *Journal of Management Studies*, 31, (6), 807–828

Brown, S.A., A.P. Massey, M.M. Montoya-Weiss & J.R. Burkman (2002). Do I really have to? User acceptance of mandated technology. *European Journal of Information Systems,* 11, 283-295.

Brooks, A.K. (1994). Power and the production of knowledge: collective team learning in work organizations. *Human Resource Development Quarterly*, 5, 213–234.

Bullen, C.V., & Benett, J.L. (1990). Learning from user experience with groupware. In: *Proceedings ACM 1990 Conference on Computer Supported Cooperative Work (CSCW'90)*. October, 7–10, Los Angeles, CA US: ACM Press, 291–302.

Burkhardt, M.E., & Brass, D.J. (1990). Changing patterns of patterns of change: the effects of a change in technology on social network structure and power. *Administrative Science Quarterly*, 35, (1), 104–127.

Butterfield, J., Rathman, S., & Whinston, A. (1993). Groupware perceptions and reality: An e-mail survey. In: J.F. Nunamaker & R.H. Sprague (Eds*.), Proceedings of the 26th Annual Hawaii International Conference on System Sciences (HICSS'93), Vol. 4, Information systems: collaboration technology.* January, 3–6, Los Alamitos, CA: IEEE Computer Society Press, 208–217.

Callon, M. (1987). Society in the making: the study of technology as a tool for sociological analysis. In: W.E. Bijker, T.P. Hughes, and T.P. Pinch (Eds.), *The social construction of technological systems: new directions in the sociology and history of technology* (pp. 83–103). Cambridge, MA: MIT Press.

Callon, M. (1991). Techno-economic networks and irreversibility. In: J. Law (Eds.), *A sociology of monsters: essays on power, technology and domination* (pp. 132–161), Routledge: London.

Callon, M. (1999). Actor-network theory–the market test. *Sociological Review*, 9, 181–195.

Campion, M.A., Papper, E.M., & Medsker, G.J. (1996). Relations between work team characteristics and effectiveness: a replication and extention. *Personnel Psychology,* 49, 429–452.

Cannon-Bowers, J.A., Tannenbaum, S.I., Salas, E., & Volpe, C.E. (1995). Defining competencies and establishing team training requirements. In: R.A. Guzzo and E. Salas (Eds.), *Team effectiveness and decision making in organisations* (pp. 333–380). San Francisco: Jossey-Bass.

Caron, R.J., Jarvenpaa, S.L., & Stoddard, D.B. (1994). Business reengineering at CIGNA Corporation: experiences and lessons learnt from the first five years. *MIS Quarterly*, 18, (3), 233–250.

Carrol, J.M. (1997). Human-computer interaction: psychology as a science of design. *International Journal of Human-Computer Studies*, 46, 501–522.

Ciborra, C.U. (1996). Introduction. In: C.U. Ciborra (Eds.) *Groupware & Teamwork: Invisible Aid or Technical Hindrance?* Wiley, Chichester, U.K.

Ciborra, C.U. (1999). A theory of information systems based on improvisation. In: W.L. Currie and B. Galliers (Eds.), *Rethinking management information systems* (pp. 136–157), Oxford University Press.

Chan, Y.E., Huff, S.L., Barclay, D.W., & Copeland, D.G. (1997). Business strategic orientation, information systems strategic orientation and strategic alignment. *Information Systems Research*, 8, (2), 125–150.

Chin, W., Gopal, A., & Salisbury, W. (1997). Advancing the theory of adaptive structuration: the development of a scale to measure faithfulness of appropriation. *Information Systems Research*, 8, 343–367.

Claver, E., Llopis, J., Gonzales, M.R., & Gasco, J.L. (2001). The performance of information systems through organisational culture. *Information Technology & People,* 14, (3), 247–260.

Coleman, D. (1995). Groupware technology and applications: an overview of groupware. In : D. Coleman and R. Khanna (Eds.), *Groupware: technologies and applications* (pp. 3–41). Prentice Hall PTR.

Comptroller-General (1979). *Report to Congress*, FGMSD-80-4.

Connoly, J.M., & Keutner, T. (1988). *Hermeneutics versus science? Three German views*. University of Notre Dame Press, Indiana: Notre Dame.

Cooper, R.G. (1999). From experience: the invisible success factors in product innovation. *Journal of Product Innovation Management*, 16, 115–133.

Cooren, F. (2004). Textual agency: how texts do things in organizational settings. *Organization: InterdisciplinaryJjournal of Organization Theory and Society*, 11, (3), 373 – 393.

Corbin, J., & Strauss, A. (1990). Grounded theory research: procedures, canons, and evaluative criteria. *Qualitative Sociology*, 13, 3–21.

Crabtree, A. (2003). *Designing collaborative systems. A practical guide to ethnography.* Berlin: Springer-Verlag.

Crossan, M.M., Lane, H.W., & White, R.E. (1999). An organisational learning framework: from intuition to institution. *Academy of Management Review*, 24, (3), 522–537.

Crowston, K. (1997). A coordination theory approach to organizational process design. *Organisation Science*, 8 (2), 157–175.

Currie, W.L, & Galliers, B. (1999). *Rethinking management information systems: An interdisciplinary perspective*. Oxford University Press.

Daft, R.L., & Lengel, R.H. (1986). Organisational information requirements, media richness and structurational design. *Management Science*, 32, 554–571.

Dale, T. (1994). The evolution of interpersonal computing. In: P.Lloyd (Eds.), *Groupware in the 21st century. Computer supported cooperative working toward the Millenium*. London: Adamantine Press Limited.

Davis, Fred (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13, 319–339.

Davis, F.D., Bagozzi, R.P., & Warshaw, P.R. (1989). User acceptance of computer technology: a comparison of two theoretical models. *Management Science*, Aug. 1989, 35, (8), 982–1004.

Davies, L.J., & Nielsen, S. (1992). An ethnographic study of configuration management and documentation practices in an information technology center. In: K.E. Kendall, K. Lyytinen, and J.I. De Gross (Eds.), *The impact of computer supported technology on information systems development*, Amsterdam: Elsevier/North Holland.

Degand, L., Bestgen,Y., Spooren, W., & Waes, L. (2001) (Eds.). *Multidisciplinary approaches to discourse*. Munster: Nodus-Publ.

Dawson, P., Clause, C., & Nielsen, K. (2000). Political processes in management, organization and the social shaping of technology. *Technology Analysis & Strategic Management*, 12, (1), 5–15.

Deming, W.E. (1993). *The new economists of industry, government, education*. Cambridge, MA: MIT Centre for Advanced Engineering Study.

Denzin, N. (1970). *The research act in sociology*. London: Butterworth

DeSanctis, G., & Poole, M. (1994). Capturing the complexity in advanced technology use: adaptive structuration theory. *Organisation Science*, 5, (2), 121–147.

De Vreede, G.J., Jones, N., & Mgaya, R. (1999). Exploring the application and acceptance of group support systems in Africa. *Journal of Management Information Systems,* 15, (3), 197-212.

Dignum, V. (2004). *A model for organisational interaction*. PhD thesis, SIKS Dissertation Series. No. 2004-1.

Dilthey, W. (1969/1978). *Gesammelte schriften*, Stuttgart: Teubner.

Dixon, N. (1994). *The organisational learning cycle*. London: McGraw-Hill.

Doherty, N.F., & King, M. (1998). The importance of organisational issues in systems development. *Information Technology & People*, 11, (2), 104–123.

Doll, W.J., & Torkzadeh, G. (1990). The measurement of end-user software involvement. *OMEGA*, 18, (4), 399–406.

Dourish, P., Holmes, J., McLean, A., Marqvardsen, P., & Zbyslaw, A. (1996). Freeflow: mediating between representation and action in workflow systems. In: *Proceedings ACM 1996 Conference on Computer Suppported Cooperative Work (CSCW' 96).* November, 16–20, Cambridge MA USA: ACM Press, 190–198.

Drummond, H. (1996). *Escalation in decision making: the tragedy of Taurus*. Oxford: Oxford University Press.

Drucker, M. (2003). *Organisatievernieuwing en medezeggenschap*. PhD thesis, The Netherlands: Twente University Press.

Druskat, V.U., & Kayes, D.C. (2000). Learning versus performance in short-term project teams. *Small Group Research*, 31, (3), June 2000, 328–353.

Edmondson, A. (1999). Psychological safety and learning behaviour in work teams. *Administrative Science Quarterly*, 44, (2), 350–383.

Ehrenhard, M.L., Muntslag, D.R., & Wilderom, C.P.M. (2004). Implementation of Managing for Results: a structurational analysis: interpretations of middle managers' behaviours in the Dutch Ministries. Paper presented at the *20th European Group for Organisational Studies (EGOS) Colloquium*, Ljubljana, Slovenia, 3–6 July.

Eisenhardt, K.M. (1989). Building theories from case study research. *Academy of Management Review,* 14, (4), 532–550.

Elliot, R. (1996). Discourse analysis: exploring action, function and conflict in social texts. *Marketing Intelligence & Planning*, 14 (6), 65–68.

Ellis, C.A., Gibbs, S.J., & Rein, G.L. (1991). Groupware: some issues and experiences. *Communication of the ACM*, 34 (1), 38–58.

Ellis, C., & Wainer, J. (1994). A conceptual model of groupware. In: *Proceedings ACM 1994 Conference on Computer Supported Cooperative Work (CSCW'94*). October, 22–26, Chapel Hill, NC, USA: ACM Press, 79–88.

Ettlie, J. (1986). Implementing manufacturing technologies: lessons from experience. In: D.D. Davis (Eds.), *Managing technological innovation: organisational strategies for implementing advanced manufacturing technologies*. San Francisco: Jossey-Bass.

Ewusi-Mensah, K., & Przasnyski, Z.H. (1994). Factors contributing to the abandonment of information systems development projects. *Journal of Information Technology*. 9, (3), 185–201.

Fairclough, N. (1995). *Critical discourse analysis*. London: Longman.

Feenberg, A. (1992). From information to communication: the French experience with Videotex. In: M. Lea (Eds.), *Contexts of computer-mediated communication.* London UK: Harvester-Wheatsheaf.

Fehse, K.I.A. (2002). *The role of organisational politics in the implementation of information systems. Three cases in a hospital context*. PhD thesis, Enschede, The Netherlands.
Fetterman, D.M. (1989). *Ethnography step by step*. Newbury Park, CA: Sage.
Fiol, C.M. (1990). Narrative semiotics: theory, procedure an illustration. In: A.S. Huff (Eds.), *Mapping strategic thought* (pp. 377–402). Chichester: Wiley.
Fleischer, M., Liker, J., & Arnsdorf, D. (1987). *Effective use of computer-aided design and computer-aided engineering in manufacturing*. Ann Arbor, MI: Industrial Technology Institute.
Friedman, A.L. (1989). *Computer systems development: history, organization, and implementation*. John Wiley: Chichester.
Fulk, J., Schmitz, J.A., & Schwarz (1992). The dynamics of context-behaviour Interactions in computer-madiated communication. In: M. Lea (Eds.), *Contexts of computer-mediated communication,* London UK: Harvester-Wheatsheaf.
Gadamer, H.-G. (1966). *Philosophical hermeneutics*. Berkeley, University of California Press.
Gadamer, H.-G. (1975). *Truth and method*, London: Sheed and Ward.
Gadaner, H.-G. (1976). The historicity of understanding. In: P. Connerton (Eds.), *Critical sociology, Selected readings* (pp. 117–133). UK: Penguin Books Ltd, Harmondsworth.
Gadamer, H.-G. (1985). *Philosophical apprenticeships*. Cambridge: MIT Press.
Gadamer, H.-G. (1994). Foreword. In: J. Grondin (Eds.), *Introduction to philosophical hermeneutics*. New Haven and London : Yale University Press.
Galal, G.H., & McDonnel, J.T. (1997). Knowledge-based Systems in context: a methodological approach to the qualitative issues. *AI & Society,* 11, 104-121.
Garnsey, E., & Rees, B. (1996). Discourse and enactment: gender inequality in text and context. *Human Relations*, 49, 1041–1064.
Gasson, S, & Holland, N. (1996). The nature and processes of IT-related change. In: W.J. Orlikowski, G. Walsham, M.R. Jones and J.I. DeGross (Eds.), *Information Technology and Changes in Organizational Work, Proceedings of IFIP WG 8.2 Conference.* December, Cambridge, UK: Chapman & Hall, 213–234.
Gardner, M. (1993). The great Samoan hoax. *Sceptical Inquire*, 17, 131 –135.
Geertz, C. (1973). *The interpretation of cultures*. New York: Basic Books.
Gibbs, W. (1994). Software chronic crisis. *Scientific American*, 271, (3), September, 72–81.
Giddens, A. (1984). *The constitution of society*. Cambridge: Polity.
Gill, R. (1996). Discourse analysis: practical implementation. In: J.T.E. Richardson (Eds.), *Handbook of Qualitative research methods for psychology and social sciences* (pp. 141–156). Leicester: British Psychological Society.
Gladen, G.R. (1982). Stop the life-cycle, I want to get off. *Software Engineering Notes*, 7, (2), 35–39.
Gladstein, G.L. (1984). Groups in context: a model of task group effectiveness. *Administrative Science Quarterly*, 29, 499–517.
Glaser, B.G. (1992). *Emergence vs. forcing. advances in the methodology of grounded theory*. Mill Valley, CA: Sociology Press.
Goodhue, D.L., & Thompson, R.L. (1995). Task-technology fit and individual performance. *MIS Quarterly/* June, 213–233.
Gottschalk, P. (1999). Implementation predictors of strategic information systems plans. *Information & Management*, 36, 77–91.
Greimas, A.J. (1987). *On meaning. Selected writings in semiotic theory.* London: Frances Pinter.
Grant, D., Keenoy, T., & Oswick, C. (2001). Organisational discourse. *International Studies of Management & Organisation*, 31 (3), Fall 2001, 5–24.
Griffith, T.L. (1996). Cognitive elements in the implementation of new technology: can less information provide more benefits? *MIS Quarterly/* March 1996, 99–110.
Griseri, P. (2002). *Management knowledge*. New York: Palgrave.
Grondin, J. (1994), *Introduction to philosophical hermeneutics*. New Haven and London: Yale University Press.
Grudin, J. (1994). CSCW: history and focus. *IEEE Computer*, 27 (5), 19–26.
Gutek, B.A. (1990). Work group structure and information technology: a structural contingency approach. In: J. Galegher, R.E. Kraut and C. Egido (Eds.), *Intellectual teamwork: social and technological foundations of cooperative work*, Lawrence Erlbaum Associates: Hillsdale.

Guzzo, R.A., & Dicson, M.W. (1996). Teams in organisations: recent research on performance and effectiveness. *Annual Review of Psychology*, 47, 307–338.

Hackman, J.R. (1987). The design of work teams. In: J.Lorsch (Eds.), *Handbook of organisational behaviour* (pp. 315–342). Englewood Cliffs, NJ: Prentice Hall.

Hackman, J.R. (Eds.), (1990). *Groups that work and those that don't*. San Francisco: Jossey-Bass.

Hammersley, M. (1992). *What's wrong with ethnography. Methodological explanations*. London: Routledge.

Hammersley, M., & Atkinson, P. (1995). *Ethnography. Principles in practice*, 2nd edition, London: Routledge.

Hardy, C. (2001). Researching organizational discourse. *International Studies of Management & Organization*, 31(3), Fall 2001, 25–47.

Hardy, C. (2004). Scaling up and bearing down in discourse analysis: questions regarding textual agencies and their context. *Organization*, 11, (3), 415–425.

Henderson, J.C., & Venkatraman, N. (1993). Strategic alignment: a model for organisational transformation through information technology. *IBM System journal*, 32, (1), 4–16.

Hendriks, P. (1999). Why share knowledge? The influence of ICT on the motivation for knowledge sharing. *Knowledge and Process Management*, 6 (2), 91–100.

Hettinga, M., & Schippers, M. (2001). Invisible forces in favour of the status quo: stimulating reflective restructuring. In: K. Sikkel, T. Bondarouk, M. Hettinga, J.G. Schuurman (Eds.), *Learning Groups– report of a workshop at the 7th European Conference on Computer Supported Cooperative Work*, Telematica Instituut, Enschede, the Netherlands.

Hettinga, M. (2002).*Understanding evolutionary use of groupware*. PhD thesis, Telematica Instituut Fundamental Research Series, No. 007 (TI/FRS/007), Telematica Instituut, Enschede, The Netherlands.

Holman, D., Pavlica, K., & Thorpe, R. (1997). Rethinking Kolb's theory of experiential learning: the contribution of social constructivism and activity theory. *Management Learning*, 28, 135–148.

Holtman, C. (1994). Groupware: its past and future. In: P.Lloyd (Eds.), *Groupware in the 21st century. Computer supported cooperative working toward the Millenium*. London: Adamantine Press Limited.

Hughes, J. (2000). Grounded theory: never knowingly understood. *Information Systems Review,* 1, 181-197.

Hussin, H., King, M., & Cragg, P. (2002). IT alignment in small firms. *European Journal of Information Systems*, 11, 108–127.

Ives, B., & Olson, M.H. (1984). User involvement and MIS success: a review of research. *Management Science,* 30, (5), 586–603.

Jans, B.D., Colquitt, J.A., & Noe, R.A. (1997). Knowledge worker team effectiveness: the role of autonomy, interdependence, team development, and contextual support variables. *Personnel Psychology*, 50, 877–903.

Jarvis, P. (1987). *Adult learning in the social context*. London: Croom Helm.

Johnson, J. (1995). Chaos: the dollar drain of IT project failures. *Application Development Trends*, January, 41–47.

Jones, M. (1999). Structuration theory. In: W.L. Currie and B. Galliers (Eds.), *Rethinking management information systems* (pp. 103–135). Oxford University Press.

Jones, M., & Nandhakumar, J. (1993). Structured development? A structurational analysis of the development of an executive information system. In: D. Avison, J.E. Kendall, and J.I. DeGross (Eds.), *Human, Organisational and social dimensions of information systems development.* Amsterdam: North-Holland.

Joschi, K. (1991). A model of users' perspective on change: the case of information systems technology implementation. *MIS Quarterly*/ June 1991, 229–242.

Kagan, S. (1993). *Co-operative learning*. San Clemente, CA: Kagan Co-operative Learning.

Karahanna, E. & D.W. Straub (1998). The psychological origins of perceived usefulness and ease-of-use. *Information & Management,* 35 (1999), pp. 237-250.

Karsten, H. (2003). Constructing interdependencies with collaborative information technology. *Computer Supported Cooperative Work*, 12, 437–464.

Kasl, E., Marsick, V., & Dechant, K. (1997). Teams as learners. A research-based model of team learning. *Journal of Applied Behavioural Science*, 33, (2), 227–246.

Katsma, C., & Muntslag, D. (2003). ERP implementations and organisational change: a typology. In: G. Dhillon, R. Hackney, and E.L.Wagner (Eds.), *Abstracts of the Organisations and Society in Information Systems (OASIS'03) Workshop*. 14 December, Seattle, Washington, USA.

Katz, J.P., & Townsend, J.B. (2000). The role of information technology in the fit between culture, business strategy and organisational structure of global firms. *Journal of Global Information Management*, 8, (2), 24–35.

Kayes, D.C. (2002). Experiential learning and its critics: preserving the role of experience in management learning and education. *Academy of Management, Learning & Education*, 1, (2), 137–150.

Keen, P.G.W. (1981). Information systems and organisational change. *Communications of the ACM,* 24, (1), 24–33.

Khoshafian, S., & Buckiewicz, M. (1995). *Introduction to groupware, workflow, and work-group computing*. New York, NY: John Wiley & Sons.

Kim, D.H. (1993). The link between individual and organizational learning. *Sloan Management Review*, 35, (1), 37 –50.

Kinney, S.T., & Panko, R.R. (1996). Project teams: profiles and member perceptions. In: J.F. Nunamaker and R.H. Sprague (Eds.), *Proceedings of the 29th Hawaii International Conference on System Sciences, (HICSS'96), Vol 3, Collaborative Systems and Technology*. January, 3–6, Maui, Hawaii: IEEE Computer Society Press, 128–138.

Kirby-Green, F. (1993). Wessex Man. *Panorama*, London: BBC News and Current Affairs, 12 July.

Klein, H.K., & Myers, M.D. (1999). A set of principles for conducting and evaluating interpretive field studies in information systems. *MIS Quarterly*, 23, (1), 67–94.

Klein, K.J., Hall, R.J., & Laliberte, M. (1990). Training and the organisational consequences of technological change: a case study of computer-aided design and drafting. In: U.E. Gattiker & L. Larwood (Eds.), *Technological innovation and human resources: end-user training* (pp. 7–36). New York: De Gruyter.

Klein, K.J., & Ralls, R.S. (1997). The unintended organisational consequences of technology training: implications for training theory, research, and practice. In: J.K. Ford, S. Kozlowski, E. Salas, & M. Teachout (Eds.), *Improving training effectiveness in organizations* (pp. 323–354). Hillsdale, NJ: Erlbaum.

Klein, K.J., & Sorra, J.S. (1996). The challenge of innovation implementation. *Academy of Management Review*, 21, (4), 1055–1080.

Klein, K.J., Conn, A.B., & Sorra, J.S. (2001). Implementing computerized technology: an organizational analysis. *Journal of Applied Psychology*, 86, (5), 811–824.

Kling, R. (1987). Defining the boundaries of computing across complex organizations. In: R. Boland and R.A. Hirscheim (Eds.), *Critical issues in information systems research*. Wiley: Chichester.

Kolb, D. A. (1984). *Experiential learning. Experience as the source of learning and development*. N.J.: Prentice-Hall, Englewood Cliffs.

Kolbe, R.H., & Burnett, M.S. (1991). Content-analysis research: an examination of applications with directives for improving research reliability and objectivity. *The Journal of Consumer Research*, 18, (2), 243–250.

Krippendorff, K. (1980). *Content analysis. An introduction to its methodology.* Beverly Hills, CA: Sage.

Kuruppuarachchi, P.R., Mandal, P., & Smith, R. (2002). IT project implementation strategies for effective changes: a critical review. *Logistics Information Management*, 15, (2), 126–137.

Kuuti, K., & Arvonen, T. (1992). Identifying potential CSCW applications by means of activity theory concepts: a case example. In: *Proceedings ACM 1992 Conference on Computer Supported Cooperative Work (CSCW'92)*. October, 31–November, 4, Toronto, Canada: ACM Press, 233–240.

Kwok, R.C-W., Lee, J.-N., & Pi, S.-M. (2002). Role of GSS on collaborative problem-based learning: a study on knowledge externalisation. *European Journal of Information Systems,* 11, 98–107.

Laswell, Harold D. (1946). Describing the contents of communication. In: B. L. Smith, Harold D. Laswell, and R.D. Casey (Eds.), *Propaganda, Communication and Public Opinion* (pp. 74–94). Princeton, NJ: Princeton University Press.

Latour, B. (1991). Technology is society made durable. In: J. Law (Eds.), *A sociology of monsters: essays on power, technology and domination* (pp. 103–131). London: UK: Routledge.

Latour, B. (1999). On recalling ANT. In: J. Law and J. Hassard (Eds.), *Actor network theory and after* (pp. 13–25), Oxford, UK: Blackwell Publishers.

Law, J. (1991). *A sociology of monsters: essays on power, technology and domination*. London, UK: Routledge.
Lea, M., O'Shea, T., & Fung, P. (1995). Constructing the networked organization: content and context in the development of electronic communications. *Organisation Science*, 6, (4), 462–478.
Lederer, A.L., & Salmela, H. (1996). Towards a theory of strategic information systems planning. *Journal of Strategic Information Systems*, 5, 237–253.
Lee, A.S. (1989) A Scientific Methodology for MIS Case Studies. *MIS Quarterly*, 13, (1), 33-50.
Lee, A.S. (1999). Researching MIS. In: W. Currie and R. Galliers (Eds.), *Rethinking management information systems* (pp. 7–28). Oxford University Press.
Leede, J. de (1997). *Innoveren van onderop. Over de bijdrage van taakgroepen aan product- en procesvernieuwing.* PhD thesis, Enschede, The Netherlands.
Lehman, J.H. (1979). How software projects are really managed? *Datamation*, 119–129.
Leonard-Barton, D., & Deschamps, I. (1988). Managerial influence in the implementation of new technology. *Management Science*, 34, (10), 1252–1265.
Levine, L. (2001). Interacting knowledge and processes in a learning organization. *Information systems management*, Winter 2001, 2–32.
Lim, K.H., & Benbasat, I. (2000). The effect of multimedia on perceived equivocality and perceived usefulness of information systems. *MIS Quarterly*, 24, (3), 449–471.
Limburg, D.O. (2002). *Making tele-work a reality*. PhD thesis, University of Twente, Enschede, The Netherlands: Twente University Press.
Lincoln, Y.S., & Guba, E.G. (1985). *Naturalistic inquiry*. Beverly Hills, CA: Sage.
Looise, J.C. (1996). Social innovation is necessary, but how? *Inauguration speech*, University of Twente (published in Dutch).
Looise, J.C. (2001). Onderzoek in de afdeling Human Resource Management Universiteit Twente. *Tijdschrift voor HRM*, 12, (7), 1203.
Looise, J.C., & Van Riemsdijk, M., (1998). Company labour flexibility strategies in The Netherlands: an institutional perspective. *Employee Relations*, 20, (5), 461–483.
Lou, H., & Scamell, R.W. (1996). Acceptance of Groupware: the relationships among use, satisfaction, and outcomes. *Journal of Organisational Computing and Electronic Commerce*, 6, (2), 173–190.
Lu, H.P. (1995). Managerial behaviour over MIS growth stages. *Management Decision*, 33, (7), 40–46.
Lu, H.P., Yu, H.Y., & Lu, S.S.K. (2001). The effects of cognitive style and model type on DSS acceptance: an empirical study. *European Journal of Operational Research*, 131, 649–663.
Lucas, H.C. (1975). *Why information systems fail*. Columbia University Press: New York.
Lucas, H.C. (1981). *Implementation–the key to successful information systems*. New York: Columbia University Press.
Lutz, C.A., & Collins, J.L. (1993). *Reading National Geographic*. Chicago: University of Chicago Press.
Lynn, G.S., Reilly, R., & Akgun, A.E. (2000). Knowledge management in new product teams: practices and outcomes. *IEEE Transaction on Engineering Management*, 47, (2), 221–231.
Majchrzak, A., Rice, R.E., Malhorta, A., King, N., & Ba, S. (2000). Technology adaptation: the case of a computer-supported inter-organisational virtual team. *MIS Quarterly*, 24, 569–600.
Malone, T.W., & Crowston, T.W. (1990). What is coordination theory and how can it help design cooperative work systems? In: *Proceedings ACM 1990 Conference on Computer Supported Cooperative Work (CSCW'90).* October, 7–10, Los-Angeles, CA: Association for Computing Machinery, 357–370.
Mark, G., & Wulf, V. (1999). Changing interpersonal communication through groupware use. *Behaviour & Information Technology*, 18, (5), 385–395.
Markus, M.L., & Robey, D. (1988). Information technology and organisational change: causal structure in theory and research. *Management Science*, 34, (5), 583–598.
Markus, M.L. (2004). Technochange managemnt: using IT to drive organisational change. *Journal of Information Technology*, 19, 4–20.
Marsick, V. (1987). *Learning in the workplace*. London: Croom Helm.
Martinez, E. (1994). Avoiding large-scale information systems project failure: the importance of fundamentals. *Project Management Journal*, 25, (2), 17–25.
Mauws, M.K. (2000). But is it art? Decision making and discursive recourses in the field of cultural production. *Journal of Applied BehavioralSscience*, 36, 229–244.

Mayer, R.C., & Davis, J.H. (1995). An integrative model of organisational trust. *Academy of Management Review*, 20, (3), 709–734.

Mayhew, D.J. (1992). *Principles and guidelines in software user interface design.* 1st edition. Englewood Cliffs, NJ: Prentice Hall.

McDermott (1999). Why information technology inspired but cannot deliver knowledge management. *California Management Review*, 41 (4), 103 –117.

McGrath, J.E., & Hollingshead, A.B. (1994*). Groups interacting with technology. Ideas, evidence, issues, and an agenda.* London: Sage Publications.

McGrath, K. (2002). In a mood to make sense of technology: a longitudinal study of discursive practices at the London Ambulance Service. In: E.H. Wynn, E.A. Whitely, M.D. Myers, and J.I. DeGross (Eds.), *Global and organisational discourse about information technology*, *Proceedings of the IFIP TC8/ WG8.2 Working Conference*. December 12-14, Barselona, Spain: Kluwer Academic Publishers, 485–506.

McLoughlin, I., Badham, R., & Couchman, P. (2000). Rethinking political process in technological change: socio-technical configurations and frames. *Technology & Strategic Management*, 12, (1), 17–37.

Meyers, P.W., Sivakumar, K., & Nakata, C. (1999). Implementation of industrial process innovations: factors, effects, and marketing. *Journal of Product Innovation Management*, 16, 295–311.

Miettinen, R. (1998). About the legacy of experiential learning. *Lifelong Learning in Europe*, 3, 165–171.

Miles, M., & Huberman, A. (1994). *Qualitative data analysis*. Thousand Oaks, CA: Sage.

Mingers, J. (2001). Combining IS research methods: towards a pluralist methodology. *Information Systems Research*, 12, (3), 240–259.

Miranda, S.M., & Bostrom, R.P. (1993). The impact of Group Support Systems on group conflict and conflict management. *Journal of Management Information Systems*, 10, (3), 63–95.

Mitev, N. (1996). Social, organisational, and political aspects of information systems failures: the computerised reservation system in French Railways. In: *Proceedings of the 4th European Conference on Information Systems (ECIS'96).* July, 2–4, Lisbon, 1213–1222.

Montealegre, R., Nelson, J., & Appelgate, L.M. (1996). BAE automated system: implementing the Denver International Airport baggage-handling system. *Harvard Business School*, Boston: Harvard Business School.

Morris, M.G., & Vekantesh, V. (2000). Age difference in technology adoption decisions: implications for a changing work force. *Personnel Psychology*, 53, 375–403.

Mulder, I., Swaak, J. & Kessels, J. (2002). Assessing group learning and shared understanding in technology-mediated interaction. *Educational Technology and Society, 5* (1), pp. 35-47.

Mumford, E. (1999). Routinisation, re-engineering, and socio-technical design: changing ideas on the organization of work. In: W.L. Currie and B. Galliers (Eds.), *Rethinking management information systems* (pp. 28–45). London, UK: Oxford University Press.

Mumford, M. (2000). Managing creative people: strategies and tactics for innovation. *Human Resource Managemnt Review*, 10, (3), 313–351.

Muntslag, D. R. (2001). *De kunst van het implementeren*. Inauguration speech, University of Twente, The Netherlands. Best: Dennis R. Muntslag.

Myers, M.D. (1994). A disaster for everyone to see: an interpretive analysis of a failed IS project. *Accounting, Management, and Information Technologies*, 4, (4), 185–201.

Myers, M.D. (1999). Investigating information systems with ethnographic research. *Communications of the AIS*, 2, (23), 1–19.

Myers, M.D., & Young, L.W. (1997). Hidden agendas, power, and managerial assumptions in information systems development: an ethnographic study. *Information Technology & People*, 10, (3), 224–240.

Nagasundram, M., & Bostrom, R.P. (1994). The structuring of creative processes using GSS: a framework for research. *Journal of Management Information Systems*, 11, (3), 87–114.

Nardi, B.A. (1996). Studying context: a comparison of activity theory, situated action models, and distributed cognition. In: B.A. Nardi (Eds*.), Context and consciousness. Activity theory and human-computer interaction* (pp. 69–102). Cambridge: MIT Press.

Neilson, R.E. (1997). *Collaborative technologies and organisational learning*. Hershey, PA: Idea Group Publishing.

Nelson, K.M. & Cooprider, J.C. (1996). The contribution of shared knowledge to IS group performance. *MIS Quarterly*, 20 (4), 409–429.

Neuwirth, C. M., Kaufer, D.S., Chandhok, R., & Morris, J.H. (1990). Issues in the design of computer support for co-authoring and commenting. In: *Proceedings 1990 ACM Conference on Computer Supported Cooperative Work (CSCW' 90)*. October, 7–10, Los Angeles, CA, USA: ACM Press, 183–195.

New, C.C., & Myers, A. (1986). *Managing manufacturing operations in the UK, 1975–1985*. Cranfield: British Institute of Management.

Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organization Science*, 5, (1), 41–60.

Nolinske, T., & Millis, B. (1999). Co-operative learning as an approach to pedagogy. *The American Journal of Occupational Therapy*, 53 (1), 31–40.

Nunamaker, J.F., Dennis, A.R., Valacich, J.S., Vogel, D.R., & George, J.F. (1991). Electronic meeting systems to support group work. *Communications of the ACM*, 34 (7), 40–61.

Nutt, P.C. (1986). Tactics of implementation. *Academy of Management Journal*, 29, (2), 230–261.

O'Connor, E.S. (1995). Paradoxes of participation: textual analysis and organizational change. *Organisation Studies*, 16, 769–803.

Oevermann, U. (1996). Becketts "Endspiel" als Prüfstein hermeneutischer methodologie. Eine interpretation mit den verfahren der objektiven hermeneutik. In: H.-D. König (Eds.), *Neue versuche, becketts endspiel zu verstehen* (pp. 93–249). Frankfurt: Suhrkamp.

Orlikowski, W. (1992). The duality of technology: rethinking the concept of technology in organizations. *Organisation Science*, 3, (3), 398–427.

Orlikowski, W. (1993). CASE tools as organisational change: investigating incremental and radical changes in systems development. *MIS Quarterly*/September 1993, 309–339.

Orlikowski, W. (1996). Evolving with Notes: Organisational change around groupware technology. In: C.U. Ciborra (Eds.), *Groupware and teamwork* (pp. 23–59). John Wiley & Sons Ltd.

Orlikowski, W.J. (2000). Using technology and constituting structures: a practice lens for studying technology in organisations. *Organization Science*, 11 (4), 404–428.

Orlikowski, W., & Barley, S.R. (2001). Technology and institutions: what can research on information technology and research on organizations learn from each other? *MIS Quarterly*, 25, (2), 145–165.

Orlikowski, W., & Baroudi, J.J. (1991). Studying information technology in organisations: research approaches and assumptions. *Information Systems Research,* 2, (1), 1–28.

Orlikowski, W.J., & Gash, C. (1994). Technological frames: making sense of information technology in organisations. *ACM Transactions on Information Systems*, 12, (2), 174–207.

Orlikowski, W., & Robey, D. (1991). Information technology and the structuring of organisations. *Information Systems Research*, 2, (2), June 1991, 143–169.

Oswick, C. (2000). Discourse, organizations and organizing: concepts, objects and subjects. *Human Relations*, 52 (9), 1115–24.

Oz, E. (1994). When professional standards are lax: the CONFIRM failure and its lessons. *Communications of ACM*, 37, (10), 29–36.

Pace, S. (2004). A grounded theory of the flow experiences of Web users. *International Journal of Human-Computer Studies*, 60, (3), 327-363.

Pandit, Maresh R. (1996). The Creation of Theory: A Recent Application of the Grounded Theory Method. *The Qualitative Report*, 2, (4).

Papows, J., & Fielding Sr, J. (1994). The future of Groupware. In: P.Lloyd (Eds.), *Groupware in the 21st century. Computer supported cooperative working toward the Millenium.* London: Adamantine Press Limited.

Parsons, G.L. (1983). Information technology: a new competitive weapon. *Sloan Management Review*, Fall 1983, 3–13.

Perry, M., & Bodkin, C. (2000). Content analysis of Fortune 100 companies Web sites. *Corporate Communications: an International Journal*, 5, (2), 87–97.

Phan, D.D., Vogel, D.R., & Nunamaker, J.F., Ir. (1995), Empirical studies in software development projects: field survey and OS/400 study. *Information and Management*, 28, 271–280.

Phillips, N., & Hardy, C. (2002). *Discourse analysis. Investigating processes of social construction*, Quality research methods, Series 50, London: Sage Publications.

Pinto, J.K. (1998). *Project management handbook*, The project management institute, 1st ed., San Francisco, CA: Jossey-Bass.

Pipek, V., & Wulf, V. (1999). A Groupware's life. In: S. Bodkler, M. King, and K. Schmidt (Eds.), *Proceedings of the 6th European Conference on Computer-Supported Cooperative Work (ECSCW'99).* September, 12–16, Copenhagen, Denmark: Kluwer Academic Publishers, Dordrecht, 199–218.

Plunkett, S. (1991). Westpac abandons high-tech hopes. *Business Review Weekly*, 8 November, 26–27.

Poole, M.C., & DeSanctis, G. (1992). Microlevel structuration in computer-supported group decision making. *Human Communication Research*, 19, (1), 5–49.

Potter, J. (1996). Discourse analysis and constructionist approaches: theoretical background. In: J.T.E. Richardson (Eds.), *Qualitative research methods for psychology and social sciences* (pp. 125–140). Leicester: British Psychological Society.

Potter, J., & Wetherell, M. (1987). *Discourse and social psychology*. London: Sage.

Pumareja, D., Bondarouk, T., & Sikkel, K. (2003). Supporting knowledge exchange isn't easy: lessons learnt from a case study. In: M. Kosrow-Pour (Eds.), *Proceedings of the 14th Information Resource Management Association International Conference (IRMA'03).* May, 18–23, Philadelphia, PA: Idea Group Publishing, Hershey, 531–534.

Purser, R.E., Pasmore, W.A., & Tenkasi, R.V. (1992). The influence of deliberations on learning in new product development teams. *Journal of Engineering and Technology Management*, 9, 1–28.

Put, F. (1996). Computerondersteunend samenwerken; classificatie en fundamenten van 'groupware'. *Informatie*, maart (march), 7-12.

Randall, D., Hughes, J., O'Brien, J., & Rodden T. (1999). Banking on the old technology: understanding the organisational context of 'legacy' issues. *Communications of the AIS*, 2, (8), 1–27.

Raymond, L., Pare, G., & Bergeron, F. (1995). Matching information technology and organizational structure: an empirical study with implications for performance. *European Journal of Information Systems*, 4, 3–16.

Rermenyi, D., Williams, B., Money, A., & Swartz E. (1998). *Doing research in business and management*. London: SAGE Publications.

Reynolds, M. (1999). Critical reflection and management education: rehabilitating less hierarchical approaches. *Journal of Management Education*, 23, 537–553.

Rice, R.E., & Aydin, C. (1991). Attitudes toward new organisational technology: network proximity as a mchanism for social information processing. *Administrative Science Quarterly*, 36, (2), 219–244.

Rivard, S. (1987). Successful implementation of end-user computing. *Interfaces*, 17, (3), 25–33.

Robey, D., & Boudreau, M. (1999). Accounting for contradictory organizational consequences of IT. *Information Systems Research*, 10, 167–185.

Robey, D., Boudreau, M.-C., & Rose, G.M. (2000). Information technology and organisational learning: a review and assessment of research. *Accounting Management and Information Technologies*, 10, 125–155.

Robey, D., & Newman, M. (1996). Sequential patterns in information systems development: an application of a social process model. *ACM Transactions on Information Systems*, 14, (1), 30–63.

Rousseau, D.M. (1989). Managing the change to an automated office: Lessons from five case studies. *Office: Technology & People*, 4, 31–52.

Ruël, H.J.M., (2001). *The non-technical side of office technology; managing the clarity of the spirit and the appropriation of office technology*. Ph.D. thesis, Enschede, The Netherlands: Twente University Press.

Ruël, H.J.M., Bondarouk, T.V., & Looise, J.C. (2004). *E-HRM: innovation or irritation? An exploration of web-based human resource management in large companies*. Utrecht, The Netherlands: Lemma.

Salaway, G. (1987). An organisational learning approach to information systems development. *MIS Quarterly*, 11, (2), 245–264.

Sanderson, D. (1992). The CSCW implementation process: an interpretative model and case study of the implementation of a videoconference system. In: *Proceedings 1992 ACM Conference on Computer Supported Cooperative Work (CSCW'1992*). October, 31–November, 4, Toronto, Canada: ACM Press, 370–377.

Sauer, C. (1999). Deciding the future for IS failures not the choice you might think. In: W.Currie and R. Galliers (Eds.), *Rethinking management information systems* (pp. 279–309). Oxford University Press.

Schippers, M. (2003). *Reflexivity in teams*. PhD thesis, Amsterdam: Ridderprint offsetdrukkerij b.v.

Schultze, U., & Leidner, D.E. (2002). Studying knowledge management in information systems research: discourses and theoretical assumptions. *MIS Quarterly*, 26, (3), 213–242.

Schuring, R.W., & Spil, T.A.M. (2002). Explaining plateaued diffusion by combining the user-IT-success factors (USIT) and adopter categories: the case of electronic prescription systems for general practitioners. *International Journal of Healthcare Technology and Management*, 4, (3), 303–318.

Searle, J.R. (1979). *Expression and meaning. Studies in the theory of Speech Acts*. Cambridge: Cambridge University Press.

Sebeok, T.A., & Danesi, M. (2000). *The forms of meaning. Modelling systems theory and semiotic analysis*. Berlin: Mouton de Gruyter.

Segars, A.H. & V. Grover (1993). Re-examining perceived ease of use and usefulness: a confirmatory factor analysis. *MIS Quarterly,* 17-4 (december 1993), 517-525.

Senge, P.M., Kleiner, A., Roberts, C., Ross, R.B., & Smith, B.J. (1994). *The fifth discipline field book: strategies and tools for building a learning organisation*. New York: Currency Doubleday.

Sinclair, J.M., & Coulthard, R.M. (1975). *Towards an analysis of discourse: the English used by teachers and pupils*. London: Oxford University Press.

Snitkin, S.R., & King, W.R. (1986). Determinants of the effectiveness of personal decision support systems. *Information & Management*, 10, (2), 83–89.

Stahl, G. (2000). A model of collaborative knowledge building. In: B. Fishman and S. O'Connor-Divelbiss (Eds.), *Proceedings of the 4th International Conference of the Learning Sciences (ICLS'2000)*. June, 14–17, Mahwah, NJ: Erlbaum, 70-77.

Stake, R.E. (1994). Case studies. In: N.K. Denzin, & Y.S. Lincoln (Eds.), *Handbook of qualitative research*. (pp. 236–247). Thousand Oaks, CA: Sage.

Standish Group (2001). *Extreme Chaos*. The Chaos Report, The Standish Group International, INC.

Stoker, J.I. (1998). *Leidinggeven aan zelfstandige taakgroepen*. PhD thesis, Enschede, The Netherlands.

Strauss, A. (1987). *Qualitative analysis for social scientists*. Cambridge: Cambridge University Press.

Strauss, A., & Corbin, J. (1990). *Basics of qualitative research*. Newbury Park, CA: Sage.

Suchman, L. (1987). *Plans and situated actions, the problem of human-machine communications*, Cambridge: Cambridge University Press.

Suh, K.S. (1999). Impact of communication medium on task performance and satisfaction: an examination of media-richness theory. *Information & Management*, 35, 295–312.

Sundstrom, E., Meuse, K.P. De, & Futrel, D. (1990). Work teams. *American Psychologist*, 45, (2), 120–133.

Sutton, D.C. (2001). What is knowledge and can it be managed? *European Journal of Information Systems*, 10, 80–88.

Swieringa, J. & Wierdsma, A. (1994). *Becoming a learning organisation*. Addison-Wesley Publishing.

Swift, T.A., & West, M.A. (1998). *Reflexivity and group processes: Research and practice*. Sheffield: The ESRC Centre for Organisation and Innovation.

Tashakkori, A., & Teddlie, C. (1998). *Mixed methodology. Combining qualitative and quantitative approaches*. Sage Publications.

Taylor, S,. & Todd, P. (1995). Assessing IT usage: the role of prior experience (in research note). *MIS Quarterly*, 19, (4), 561–571.

Taylor, W.A. (2004). Computer-mediated knowledge sharing and individual user differences: an exploratory study. *European Journal of Information Systems*, 13, 52–64.

Thompson, J.D. (1967). *Organisations in action*. New York, NY: McGraw-Hill.

Titscher, S., Meyer, M., Wodak, R., & Vetter, E. (2000). *Methods of text and discourse analysis*. London: Sage Publications.

Torka, N. (2003). *Flexibiel maar toch betrokken. De samenhang tussen contractrelatie en betrokkenheid*. PhD thesis, Enschede, The Netherlands: Twente University Press.

Tucker, A.L., Edmondson, A.C., & Spear, S. (2001). *When problem solving prevents organizational Learning*. Harvard Business School working paper 01-073.

Urquhart, C. (2001). An Encounter with Grounded Theory: Tackling the Practical and Philosophical Issues, In: E. Trauth (Eds.), *Qualitative Research in IS: Issues and Trends* (pp. 104–140). Idea Group Publishing, Hershey.

Vadapalli, A. & Mone, M.A. (2000). Information technology project outcomes: user participation structures and the impact of organization behavior and human resource management issues. *Journal of Engineering and Technology Management*, 17, 127–151.

Van der Heijden, B.I.J.M. (1998). *The measurement and development of professional expertise throughout the career*. PhD thesis, Enschede, The Netherlands.

Van der Heijden, B.I.J.M., & Brinkman, J.G. (2001). Stimulating lifelong professional growth by guiding job characteristics. *Human Resource Development International*, 4, (2), 173–198.
Van Dijk, T.A. (Eds.), (1985). *Discourse and communication: new approaches to the analysis of mass media discourse and communication*. Berlin: Walter de Gruyter.
Van Dijk, T.A. (1993). Principles of critical discourse analysis. *Discourse and Society*, 4, 249–285.
Van Dijk, T.A. (1997). *Discourse as structure and process*: Volume 1 and 2. London: Sage.
Van Riemsdijk, M. J., & Leede, J. de (2001). Flexible labour strategy in the Dutch automotive industry. *Creativity and Innovation Management*, 10, (4), 243–250.
Venkatesh, V. (2000). Determinants of perceived ease of use: integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information Systems Research*, Dec 2000, 11, (4), 342-366.
Vince, R. (1998). Behind and beyond Kolb's learning cycle. *Journal of Management Education*, 22, 304–319.
Virkkunen, J., & Kuutti, K. (2000). Understanding organisational learning by focusing on "activity systems". *Accounting, Management and Information Technologies*, 10, 291–319.
Volkoff, O. (1999). Using the structurational model of technology to analyse an ERP implementation. *Proceedings of the Fifth Americas Conference on Information Systems*, August 13–15, 1999, Milwaukee, Wisconsin, USA, 235–237.
Walsham, G. (1993). *Interpreting information systems*. Chichester: John Wiley.
Walsham, G. (1995). The emergence of interpretevism in IS research. *Information Systems Research*, 6, 376–394.
Walsham, G. (1995-a). Interpretive case studies in IS research. *European Journal of Information Systems*, 4, 74–81.
Walsham, G. (2002). Cross-cultural software production and use: a structurational analysis. *MIS Quarterly,* 26, (4), 359–380.
Walsham, G., & Han, C.-K. (1991). Structuration theory and information systems research. *Journal of Applied Systems Analysis*, 17, 77–85.
Wastell, D., & Newman, M. (1996). Information systems development in the Ambulance Service: a tale of two cities. *Proceedings of the 4th European Conference on Information Systems (ECIS'96).* July, 2–4. Lisbon, Portugal.
West, M.A. (2000). Reflexivity, revolution and innovation in work teams. In: M.M. Beyerlein, and D.A. Johnson (Eds.), *Product development teams* (Vol. 5, pp. 1–29). Stamford CT: JAI Press.
Wetherell, M., Taylor, S., & Yates, S. (2001). *Discourse theory and practice*. London: Sage Publications.
Wittgenstein, L. (1953). *Philosophical investigations*. Trans. G.E.M. Anscombe. Oxford.
Wodak, R. (2001). What CDA is about–a summary of its history, important concepts and its developments. In: R. Wodak and M. Meyer (Eds.), *Methods of critical discourse analysis* (pp. 1–14). London: Sage Publications.
Wodak, R., & Meyer, M. (Eds.), (2001). *Methods of critical discourse analysis*. London: Sage Publications.
Wolfe, R.A. (1994). Organisational innovation: review, critique and suggested research directions. *Journal of Management Studies*, 31(3), 405–431.
Woodilla, J. (1998). Workplace conversations: the text of organizing. In: D. Grant, T. Keenoy, and C. Oswick (Eds.), *Discourse and Organisation* (pp. 31–50). London: Sage.
Wooffitt, R. (2001). Researching psychic practitioners: conversation analysis. In: M. Wetherell, S. Taylor, and S.J. Yates (Eds.), *Discourse as data. A guide for analysis* (pp. 49–93). London: Sage Publications.
Woolgar, S. (1991). Configuring the user: the case of usability trials. In: J. Law (Eds.), *A sociology of monsters: essays on power, technology and domination* (pp. 58–99). London, UK: Routledge.
Works, M. (1987). Cost justification and new technology: addressing management's No! to the funding of CIM. In: L. Bertain and L. Hales (Eds.), A programme guide for CIM implementation, 2nd ed.
Wynn, E.H., Whitely, E.A., Myers, M.D., & DeGross, J.I. (2002) (Eds). *Global and organisational discourse about information technology*. *Proceedings of the IFIP TC8 / WG8.2 Working Conference*. December, 12-14, Barselona, Spain, Boston: Kluwer Academic Publishers.
Yates, J., & Orlikowski, W. (1992). Genres of organisational communication: a structurational approach to studying communication and media. *Academy of Management Review*, 17, (2), 299–326.
Yen, D.C., Wen, H.J., Lin, B., & Chou, D.C. (1999). Groupware: a strategic analysis and implementation. I*ndustrial Management & Data Systems,* 99 (2), 64–70.

Yetton, P.W., Johnston, K.D., & Craig, J.F. (1994). Computer-aided architects: a case study of IT and strategic change. *Sloan Management Review*, Summer, 57–67.
Yin, R.K. (1993). *Applications of case study research*. Sage Publications.
Zajacova, A. (2002). The background of discourse analysis: a new paradigm in social psychology. *Journal of Social Distress and the Homeless*, 11(1), 25–40.
Zuboff, S. (1988). *In the age of the smart machine: the future of work and power*. New York: Basic Books.

APPENDIX 1 : COMPARISON OF METHODS OF TEXT ANALYSIS

Method	Theoretical origins	Objectives of the method	Outline of the method	Quality criteria	Areas of application
Content analysis	A model of mass communication using Lasswell's (1946) famous formula: 'who says what to whom and with what effects' became the first theoretical basis. A causal relationship was assumed between communicator, receiver, and the communicative effect. The content had to be quantified in order to investigate those interrelationships. In the mid 1950s, at least three theories shook the approach: information theory, contingency theories, and interaction process analysis. This led to the reformulation of the method as 'communication analysis'. The preoccupation with printed texts was reduced. Since the 1960s, the explicitness of the selection procedures for the techniques has become significant in the method. The 1980s brought new characteristics into content analysis: structure and selectivity of communication process, multivariate techniques of analysis, development of indicators, electronic analytical packages, etc. (Kolbe and Burnett, 1991). Lately a combination of quantitative and qualitative techniques is widely accepted (Perry and Bodkin, 2000).	The method seeks to analyse the communicative content, i.e. to classify symbolic materials by explicit categorisation and procedural rules in order to identify specific characteristics of messages (communications).	1. Probability based, strict sample of sender(s), documents, set(s) of documents. 2. Units of analysis are the smallest components of texts in which the occurrence and properties of variables are examined. 3. Every unit of analysis must be coded (allocated to categories). The system of categories is established prior to the analysis. 4. Intra- and inter- coder reliability is the core of analysis. 5. The simplest evaluation is done by counting the number of occurrences per category (frequency), and correlation between them.	Validity: - material-oriented (semantic and sample validity) - result-oriented (correlative and prognostic validity) - process-oriented (construct validity) Reliability: - stability - replicability - precision (Krippendorf, 1980, p.158)	Wherever communicative content is of great interest and where an operational scheme can be formulated in advance.

Method	Theoretical origins	Objectives of the method	Outline of the method	Quality criteria	Areas of application
Grounded theory	Although grounded theory procedures are equally applicable to non-textual data, significant importance is attributed to texts as data in the form of interview transcripts, observer's notes, books, newspaper articles, etc. The most prominent application of grounded theory is probably text analysis. Within the framework of grounded theory, however, one will look in vain for a theory of text and for any explicit understanding of the term text (Titscher et al., 2000). This theory is one "that is inductively derived from the study of the phenomenon it represents. That is, it is discovered, developed, and provisionally verified through systematic data collection and analysis of data pertaining to that phenomenon. Therefore, data collection, analysis, and theory stand in reciprocal relationships with each other. One does not begin with the theory and then prove it. Rather, one begins with an area of study and what is relevant to that area is allowed to emerge" (Strauss and Corbin, 1990, p.23).	Aimed at generating theories on the basis of data. Text analysis using grounded theory tries to conceptualise data-based assumptions. The focus is on exploration and the generation of hypotheses, while the testing of them receives less attention.	1.Data can be collected through a variety of materials, and is not considered as a special research phase that must be completed before analysis. 2. Priority operationalisation is not required as concepts and labels are 'attached' to events or units. 3. Unlike with content analysis, concepts are developed on the basis of texts and contextual knowledge, and then categorised. 4. Coding can be based on coding families as provided by Glaser (1992) such as strategy family, or process family. 5. Three coding tactics are described: open coding (first text interpretation), axial coding (creating new relationships between concepts), and selective coding (selecting the core categories, linking them to others, and validating the links).	Quality of the research process: grounds for selective sampling major categories emerged, on what basis, indicators, etc. Quality of the findings: reproducibility generalisability.	For Strauss and Corbin (1990), the whole world of the social sciences is suitable for grounded theory, whenever new ideas, contexts, consequences, or recommendations have to be derived from texts.

Appendix 1 (continuation). Comparison of methods of text analysis

Method	Theoretical origins	Objectives of the method	Outline of the method	Quality criteria	Areas of application
Ethnographic methods	Within ethnography, there is a wide range of 'ethnographically-oriented' methods for text analysis (even including grounded theory in the opinion of some authors). The methods originated in anthropological and ethnographical works where the vital characteristic is deep reflexivity (Denzin, 1970). Text analysis is tightly based on the context of culture: culture patterns influence and build social and psychological processes that programme language and text. The question of relationships between culture and language is the starting point of the ethnography of speaking, but it leaves out such questions as how these can be specified (Geertz, 1973). The common feature of all ethnographic methods is the interpretation of texts against the background of cultural structures, or to use texts to reconstruct those cultural structures. "Doing ethnography is like trying to read a manuscript – foreign, faded, full of ellipses, incoherence, suspicious emendations… written not in conventionalised graphs but in transient examples of shaped behavior" (Geertz, 1973, p.10).	These methods seek to interpret texts against the background of cultural structures and/or to use texts to reconstruct those cultural structures.	1. Data collection is of paramount importance, where participant observation is the leading technique. 2. Data (text) analysis is interplayed with its collection, and is not a separate step in the research process. 3. Exploration of the context is crucial, and involves examining linguistic features, situational context, facial expressions, activities, etc. 4. Visualisation of the analysis is recommended through presentation as maps, flowcharts, metrics to crystallise the information (Atkinson and Hammersley, 1994).	The total rejection of 'positivistic' quality criteria as used in science but acceptance, in principle, of these criteria in a modified form (Agar, 1986): - Validity means trust in results, rather than absolute certainty (Lincoln and Guba, 1985); it is governed by commonsense plausibility and credibility, but mostly based on empirical evidence (Hammersley, 1992). - For validation assumptions different approaches are proposed: triangulation of data and methods, member check, and respondent validation (Denzin and Lincoln, 1994), prolonged engagement.	It always appears appropriate when it is not only textual patterns but also their relationships with cultural constraints that are of interest (Titscher et al., 2000). Participant observation is very important in data collection (Fetterman, 1989).

Appendix 1 (continuation). Comparison of methods of text analysis

Method	Theoretical origins	Objectives of the method	Outline of the method	Quality criteria	Areas of application
Narrative semiotics	Within ethnography, there is a wide range of 'ethnographically-oriented' methods for text analysis (even including grounded theory in the opinion of some authors). The methods originated in anthropological and ethnographical works where the vital characteristic is deep reflexivity (Denzin, 1970). Text analysis is tightly based on the context of culture: culture patterns influence and build social and psychological processes that programme language and text. The question of relationships between culture and language is the starting point of the ethnography of speaking, but it leaves out such questions as how these can be specified (Geertz, 1973). The common feature of all ethnographic methods is the interpretation of texts against the background of cultural structures, or to use texts to reconstruct those cultural structures. "Doing ethnography is like trying to read a manuscript – foreign, faded, full of ellipses, incoherence, suspicious emendations… written not in conventionalised graphs but in transient examples of shaped behavior" (Geertz, 1973, p.10).	These methods seek to interpret texts against the background of cultural structures and/or to use texts to reconstruct those cultural structures.	1. Data collection is of paramount importance, where participant observation is the leading technique. 2. Data (text) analysis is interplayed with its collection, and is not a separate step in the research process. 3. Exploration of the context is crucial, and involves examining linguistic features, situational context, facial expressions, activities, etc. 4. Visualisation of the analysis is recommended through presentation as maps, flowcharts, metrics to crystallise the information (Atkinson and Hammersley, 1994).	The total rejection of 'positivistic' quality criteria as used in science but acceptance, in principle, of these criteria in a modified form (Agar, 1986): - Validity means trust in results, rather than absolute certainty (Lincoln and Guba, 1985); it is governed by commonsense plausibility and credibility, but mostly based on empirical evidence (Hammersley, 1992). - For validation assumptions different approaches are proposed: triangulation of data and methods, member check, and respondent validation (Denzin and Lincoln, 1994), prolonged engagement.	It always appears appropriate when it is not only textual patterns but also their relationships with cultural constraints that are of interest (Titscher et al., 2000). Participant observation is very important in data collection (Fetterman, 1989).

Appendix 1 (continuation). Comparison of methods of text analysis

Method	Theoretical origins	Objectives of the method	Outline of the method	Quality criteria	Areas of application
Discourse analysis	The philosophical root of discourse analysis is to be found in the hermeneutical discussions about the universality of hermeneutics, its circle, internal and external openness, and the involvement of an interpreter (Gadamer, 1975). Understanding is considered equal to interpreting, and requires more mediation between the past and present than a simple mirroring of the social reality. *Discourse* is defined as "a system of texts that brings objects into being" (Hardy, 2001, p.26). By texts, we understand any representation of the "inner language" (in written or spoken forms) available for the researcher. Four themes in discourse analysis can be distinguished as different research foci. The first theme is that language is constructive and used to construct the social world rather than being a transparent medium of it (Potter and Wetherell, 1987). A second theme is the discourse itself, or texts in their own rights, without assumptions about some 'meaning' behind the text. A third theme is concerned with the practical orientation of discourse - its occurrence in a particular interpretive context (Gill, 1996). The focus on the language function is a major component of discourse analysis. Function, however, is not understood mechanically.	The method aims at exploring the relationship between discourse and reality, interpreting a hidden meaning, and mediating between the past and the present meanings.	Through analysing discourse, the researcher intervenes between the past and the present meanings, and translates the social events into a form that is comprehensible to the 'owners' of the discourse. By using contextual knowledge, discourse analysts link various social events, but at the same time the method grasps a community understanding of a social phenomenon. The procedure is based on the investigation of interrelationships between texts, discourses and context: 1. Research questions: including coding if necessary 2. Sampling 3. Collecting data: written and spoken texts 4. Analysis: may be multiple and include several substeps to uncover linguistic and contextual features (in our research, for example, this involved 18 steps).	Discourse analysis must be transparent in its interpretations and explanations. The value is based on the inter-subjective validity that is the interplay between: open-endedness and transparency, individual and other texts, single- and multiple-level interpretations within one set of discourses, texts and contexts, interpretations and explanations.	The only precondition to its application is the availability of comprehensive information about the phenomenon and its social and historical conditions.

Appendix 1 (continuation). Comparison of methods of text analysis

APPENDIX 2: INTERVIEW PROTOCOL

Special introductory notes

- Explanation of the procedure and how the interviewee has been selected.
- Confidentiality of the procedures, transcript, and analysis of the interview.
- Importance of interviewee's personal opinion and expressions.
- Open-ended questions as the basis for the interview.
- Topics to be discussed: information about the interviewee and the department; functional characteristics of IT; its technical features; cooperative learning; on-going use of IT.
- Verification of the transcript by the interviewee.
- Analysis of all interviews will be reported to the company and discussed in order to understand the implementation process better and make fruitful recommendations.
- During the interview the words "IT" and "system" are used interchangeably.

Basic information

- Function (official title)
- Educational background
- Job tasks, activities, and responsibilities. Did they change with a new technology?
- Experience working for the company
- Experience working for the department /group
- Experience with operating software

Adoption of the system–group learning

- Collective acting

- Could you describe the way you operate with the basic modules?
- How intensively / frequently do you operate with the system? With which modules?
- Do you happen to search for new possibilities in the system? With the colleagues or alone? Why?

- Group reflecting

- Do/ did you discuss with the team-mates the problematic issues of use of the system? [examples] How often?
- Do you actively participate in such discussions? What kind of questions are usually in the agenda?
- Did your previous software experience help in understanding those problems?
- Do you know the problems your colleagues met in operating with the system? Were they declared during the discussions?

- Knowledge disseminating

- Did you /or your colleagues come up with new ideas / new propositions on how to improve the use of the system?
- Did your colleagues ask you to help in using the system? Clarification? Demonstrating new techniques?

- Sharing understanding

- Why do you think the system was introduced?
- Did you feel the need in a new system for improving your task performance?
- Is the system important for you personally? Why?
- Do you think you understand all modules and possibilities of the system?
- Which modules of the system do you operate most of all?
- In what way does the system support cooperation?
- Are all modules and technical advantages necessary for your tasks?
- Which characteristics of the system are most attractive for you? Why?
- Which technical characteristics you consider as disadvantages? Why?
- What would you add/ improve in the system?
- What are your basic expectations concerning future use of the system?

- Mutual adjustment

- Do you discuss possible improvements of the system in the department/ group?
- Do you evaluate intermediate results within your group concerning use of the system?
- How would you indicate if introducing a new module is successful or not?

Stable use of the system

- Ease-of-use

- Are you used to operate the system now? What does it mean for you?
- How long did it take you? How long did it take your colleagues?
- What is your opinion about below characteristics and how could you illustrate your opinion?
  - System speed (too slow/ fast enough)
  - System is noisy / quite
  - System is reliable / unreliable
  - Flexible / fixed
  - Correcting mistakes (easy / difficult)
- How fast do you operate the system? With which modules?
- Is it easy to work with the system? Why?
- Is the screen friendly to use?
- Is organisation of the information on the screen clear / confusing?

- Task-system fit

- Is the system important for your tasks? Why?
- Which tasks are supported by the system?
- Support of which tasks you like most of all? Which tasks could be supported better?
- Do you think the system contains all necessary data for your tasks?
- Did the system require to change your way / style of performing job tasks? How?

Managerial support

- Autonomy and responsibility

- Who initiated the introduction of IT?
- Did you participate in the decision making during the introduction of the system? How?
- During 'getting used' to the system–what kind of responsibilities did you have? Did you have authorities to make decisions concerning use of the system? What were they?
- Was it possible to create your own style of working with the system?
- Did you have enough authority to plan your own work?

- Promoting different learning opportunities

- What were/are the educational possibilities to learn the system (training sessions, informal learning, consultations, materials)?
- Which of them were helpful most?

- Feedback

- Were your efforts to get used to the system recognised/ noticed/ paid attention to? In what ways? And now?
- Was there a special system of rewards to use the IT?

- Management style

- Did you get helpful comments on the mistakes from the managers?
- Was your gradual progress recognised? How?
- Were you rewarded for your efforts? How?
- What kind of help from the managers did /do you get concerning use of the system? In what ways do you cooperate with them?

- Time

- Did you have enough time to experiment, to discuss and try out the system?
- Did the managers allocate enough time for you to support you in getting used to the system?

Closure

- Have we discussed main issues concerning the use of the system?
- Are there any important things that were overlooked?
- The possibility to corresondence in case of questions.