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Strategies for Organizational Implementation of Networked Communication in Distributed Organizations

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ABSTRACT

This chapter presents results elicited from empirical studies of the implementation and use of an open-ended, configurable, and context specific information technology supporting networked communication in a large distributed organization. Our findings are based on a longitudinal case study of the implementation and use of the technology that spread rapidly throughout the organization. We demonstrate the kind of expectations and conditions for change that management face when implementing such technologies for computer mediated communication. Our synthesis from the empirical findings is related to two recent models, the improvisational change management model suggested by Orlikowski and Hofman (1997), and Gallivan's model for organizational adoption and assimilation (Gallivan, 2001). We operationalize the change management models by identifying and characterizing four different and general implementation contexts and propose strategies for the organizational implementation of such technologies.

KEYWORDS

Change Management, Collaborative Technologies, Computer-Mediated Communication, Distributed Work Arrangements, Emerging Information Technologies, Information Technology Adoption, IS Implementation Approaches, Lotus QuickPlace.

INTRODUCTION

This chapter deals with strategies employed by management and users in large distributed organizations in relation to networked communication. More specifically, we have studied the implementation and use of a particular technology for computer mediated communication (CMC) that has spread rapidly throughout a distributed organization. We describe the implementation and use of this open-ended and flexible product from an information systems perspective, i.e. using theories and models in relation to implementation of information technology as well as in relation to change management.

Introducing information technology in an organization has been researched under different labels such as diffusion (e.g. Rogers, 2003); infusion (e.g. Massetti and Zmud, 1996); adoption (e.g. Davis, 1989); assimilation (e.g. Fichman, 2000); and change management (e.g. Kwon and Zmud, 1987). Also researchers within Computer Supported Cooperative Work (CSCW) like Bullen and Bennet (1990), Grudin (1994), and Orlikowski (1993, 2000) have early identified technological as well as organizational and social factors influencing the implementation of information technologies to support communication and coordination in groups.

CMC technologies are often used in distributed organizations to support communication. Managers direct resources and set up goals for the implementation of CMC technologies but it is difficult to foresee the effects of the implementation. Our studies show that the outcome is definitely more complex than the apparent intended goals, and that ambitious goals might be very difficult to obtain. Generic, open-ended, configurable, and context specific CMC technologies mediate interactions among multiple distributed actors, who are not only users of the system (in the traditional sense) but also contributors to the system's evolving structure and content. Organizational models for implementing CMC technologies have only recently started to take form. The aim of this chapter is to discuss, refine, and operationalize existing models of change management with respect to the implementation issues in distributed organizations.

We present a longitudinal case study of the implementation and use of a CMC technology, a generic virtual workspace product. Throughout 18 months we studied the introduction and use of IBM Lotus QuickPlace™ in a large, distributed financial organization. For reasons of anonymity we refer to the financial company as "Summa". We have identified four typical implementation contexts in which IBM Lotus QuickPlace was used, and we have elicited six overall characteristics that influenced the implementation and use. The characteristics describe potentials as well as obstacles for change related to CMC and demonstrate the kind of expectations and conditions for change that management face when implementing generic, flexible, and open-ended CMC technologies in distributed organizations.

The empirical findings are related to two models of organizational implementation, the improvisational change management model suggested by Orlikowski and Hofman (1997) and Gallivan's model for organizational adoption and assimilation of complex technological innovations (Gallivan, 2001). We refine and operationalize these change management models by means of identifying and characterizing typical CMC implementation contexts. We generalize our findings and specify managerial challenges and potential strategies for implementing generic, open-ended, and flexible CMC technologies (such as IBM Lotus QuickPlace) in distributed organizations in relation to general implementation contexts.

IBM LOTUS QUICKPLACE IN SUMMA

In this section we describe IBM Lotus QuickPlace and its implementation in Summa. For reasons of simplicity we refer to the individual virtual workspace provided by IBM Lotus QuickPlace as a QP.

IBM Lotus QuickPlace is a typical representative of virtual workspace products, a group of products that also includes eROOM (http://www.documentum.com/eroom) and BSCW (http://bscw.gmd.de, Bentley et al., 1997) i.e. generic products for collaboration and communication in small teams. IBM Lotus QuickPlace is a flexible technology that offers users a web-based shared virtual workspace called a QuickPlace (QP) with a folder structure, notification functions, support for custom document types, joint editing of documents, shared calendar, and support for simple workflows, including facilities for version and access control. This gives the application some basic characteristics, since QP is very open in terms of which kinds of collaboration it supports. There is no suggested workflow inscribed in the technology, for example to support projects, recurrent tasks, interest groups, etc. The members of a QP need to agree on how to work together using the tool in a specific context, e.g. using the tool as a shared archive or as a coordination mechanism for collaborative work

(cf. Schmidt and Simone, 1996), and to design the structure and content of the QP accordingly. Due to its background as an Application Service Provider application (ASP), the system has a distributed security infrastructure. There is no central system administrator role with extensive access rights, but a very flexible scheme for user management. Once a particular QP is established at the central server and managers for this QP appointed, any manager can set up a room, invite others to participate in this room, and grant them privileges as managers, authors, or readers.

These characteristics make the technology both cheap to purchase and easy to implement in an organization – from an IT operations point of view. Once the QP server is installed, any users granted with manager rights can initiate a QP and define the structure by way of rooms, folders, document types, as well as access rights to other users to each room and folder. Each QP thus consists of a number of rooms (i.e. folders) containing documents, which can be reached from a single URL. Users' access to specific documents is defined partly by the managerially defined user access to rooms and folders, partly by the author of a document who can grant other people access to individual documents as well as rights to edit individual documents.

Summa was created by a merger of a number of financial companies consisting of private, corporate, and investment banks as well as insurance companies located across four European countries. Organizational units at headquarter level were formed spanning the four countries, including core business areas such as corporate banking and support functions like IT, human resources, and communications. Projects were established to merge operations across the national and organizational borders, for example rolling out a new email system and implementing standards for secure IT infrastructures between company units and customers. The aim of these projects was to create synergy and efficiency by merging complementary business functions at headquarter level, for instance sharing investment risk data, drawing upon the accumulated expertise of the merged companies. Supporting communication and coordination in these activities was vital, and QP software was deployed approximately one month after the merger for this purpose. IBM Lotus, the developers of QP software, present their product as being very easy to implement: “A QP is a place that you can create on the Internet in 30 seconds to communicate with your team, share resources, and keep track of your project” […and…] “create a Team Workspace on the Web - Instantly” (Lotus, 2001). In line with this marketing presentation the implementation process of the technology in Summa was what we choose to call lightweight, without provision of any education or guidelines apart from those on the manufacturer's web site and the built-in tutorial and help function.

IBM Lotus QuickPlace was chosen for several reasons. The technology was web-based thus needing no particular technical efforts to be integrated with the existing IT infrastructures of the pre-merger companies. The product could thus be implemented very quickly seen from an IT Operations point of view. An important factor influencing the decision to go ahead with the technology was that it offers secure (encrypted) communication - unlike conventional email. In the organization there was a positive experience with other Lotus products in general. One month after the merger the technology was installed and made available throughout Summa. The availability of the technology was announced through emails and presentations to selected groups of people, typically middle managers at headquarters. A potential QP manager should send an email to IT operations applying for a QP, justifying the request on business terms. In practice applications were approved provided there were members from geographically dispersed organizational units or project teams.

RESEARCH ACTIVITIES

Our studies of the implementation and use of QP in Summa took place in 2001-02 starting one year after the introduction of the technology. The studies concerned the implementation and use of QP in conjunction with distributed work practices and involved interviews, document analysis, a survey by a questionnaire, and log analysis. All of our analyses of this multi-faceted material were reported on and discussed with management and other informants from Summa on several occasions. On this basis we present our findings as a characterization of the implementation contexts we encountered, and we propose strategies for the implementation of CMC from an overall organizational point of view including an outline of the challenges, immediate expectations, and relevant aims to stimulate change processes. Our agreement with Summa did not include testing these strategies and recommendations in practice and thus a concrete intervention informed by our analysis was not part of the study.

The first round of interviews and document analysis were done in parallel over a period of three months in early summer 2001. The interviews lasted between 1 and 2 hours, and were based upon an interview guide that was sent to the informant in advance. Interviews were recorded and later transcribed ad verbatim. For the analysis of the interviews we appropriated a version of the affinity-diagramming technique (Brassard, 1989) to create a common understanding from the empirical material. The logging of all http transactions between client web browsers and the QP server was initiated at the end of the three-month period of interviewing and lasted for 10 months, see Bøving & Simonsen (2004) for further details. Our studies showed that the number of active QPs had grown within the first year at Summa. In the first month of our log period there were 805 active users in 80 QPs. The growth continued during the 10-month log period to 1618 active users in 126 QPs in the last month. All together more than 130 QPs comprising almost 3000 users and more than 20 Gigabyte of documents accumulated during the first two years. Table 1 summarizes the development in activity as recorded by the log files of the QP-server.

Activity measure	Development in activity
No. of active QPs	+58%
No. of active users	+101%
No. of operations	+275%
No. of operations pr. QP	+138%
No. of operations pr. user	+87%

Table 1. Development of QP activity in a 10 month period in Summa.

The recorded development in activity during the period of our study took place in spite of the lightweight implementation. Regardless of this rapid proliferation of the CMC technology observed in the organization, no resources were devoted to support and further the integration efforts in the local contexts.

IMPLEMENTATION CONTEXTS

Our investigations of the introduction and use of QP lead to the identification of four typical implementation contexts of QP. In autumn 2001 we conducted a survey by distributing a questionnaire by email to 123 QP administrators, who were in charge of a total of 77 QPs, all of which had shown to be active in the first weeks of logging QP related http transactions. The questionnaire contained 28 closed questions, 3 open questions, and an option for additional comments. The questions all related to the use of QP: who are the users, what is the QP used for, and how is it used. The questionnaire was sent out 18 months after initial deployment of QP in Summa. 56 of the administrators (45%) responded to the survey representing 53 of all QPs (65%).
The survey confirmed the general distribution of the identified implementation contexts - see table 2 showing the distribution of answers to the question: “Which group of people is using your QP?”

Implementation context	# of QP	% of QP
Organizational units	20	38
Special interest groups	6	11
Projects	17	32
Teams handling recurrent tasks	7	13
Other	3	6
Total	53	100

Table 2. Distribution of the four identified implementation contexts in Summa.

Table 2 shows that the dominant use of a QP is within the distributed organizational units or projects – accounting for 38 and 32 %, respectively, of the total amount of QP use in the survey. Use of QP in a special interest group or a team handling recurrent tasks is much less prevalent - 11 and 13% respectively, or 24% of the total amount of QP use. Only 6% of the QP use was reported outside the four implementation contexts identified by the initial interviews. In the following we characterize each of the four typical implementation contexts as observed in Summa.

Organizational Units

Following the merger, organizational units were reorganized as units from the former organizations with overlapping functions were merged into new corporate units. For example, a new corporate communications department was formed and made responsible for establishing the new name, corporate identity, media relations, etc. This department was staffed with 80 employees distributed across four countries. The staff found themselves in this new organizational setting, not knowing their new colleagues, speaking different languages, and spanning multiple organizational and domestic cultures. The starting point for this unit was typical of the units we studied during the merger, since the basis of the new entity was created by the appointment of a top manager and the production of a charter (in the form of a PowerPoint presentation), outlining of the overall areas of responsibility along with an organizational chart, and the names of the managers and employees allocated to each section in the unit.

The content of the typical QP of an organizational unit was initially structured according to the organizational chart. A member of staff was appointed as the administrator of the QP. Each section was given their own entry: a folder in QP along with a few (or no) stated guidelines for how to use it. The primary use of these QPs was distributing management information such as meeting schedules, agendas and minutes, strategies and goals for different sections. The QP was also used as an archive where users uploaded documents that they felt might be useful for others in their organizational unit. However, extensive use patterns did not develop. A reason for this was reported to be due to problems with finding specific information by browsing a structure that reflects the organizational chart and not the content of the documents. Another reason could be, that the information provided was of a general nature and not specifically needed by anyone. Thus, we can observe that QP software employed within distributed organizational units provides an information channel, but it seldom succeeds in mediating active interactions among users.

Special Interest Groups

An important aspect of complex organizations is to share knowledge and achieve synergy. In Summa, practitioners that share a professional interest in a specific topic form special interest groups where they are encouraged to take active part in knowledge sharing. Examples of such groups of practitioners are project managers, change consultants, and experts within specific technologies such as Oracle, Java, and Notes. Members of the special interest groups are distributed organizationally as well as geographically. The overall aim of establishing special interest groups was argued in knowledge management terms, for example, by enhancing possibilities for the exchange of experience and for gradually building up a kind of ‘professional handbook’ where knowledge would be represented and eventually made broadly accessible within Summa. A typical QP for this implementation context is structured according to topics relevant for the professionals of the special interest group. Their QPs contain, among other things, a bulletin board with news and events of interest, an archive with profession specific articles, and a frequently-asked-questions list.

In our studies it became clear that the special interest groups’ use of QPs is a secondary function compared to the daily work activities of the members. None of the QPs for special interest groups (typically focusing on general issues of interest) offered any kind of ‘tools’ supporting the members' daily work practices. No functions or information were found that were used frequently as an integral part of work procedures. Being a member of the interest group, and using the QP supporting this, must accordingly be understood as a detached activity compared to the daily tasks and deadlines, and thus we can conclude that spending time using the QP had a low priority.

Projects

The merger initiated an instant need for a number of cross-organizational projects: a new Internet portal presenting the merged organization, establishing a new internal email system, etc. In Summa all projects have to report results within a 6 months ‘time box’. Thus the majority of projects are completed within 6 months though some projects are extended to, for example, 12 or 18 months. The goals of using QP in the distributed projects have primarily been to support project documentation, but attempts have also been made to use QP to support coordination, problem solving, and negotiation.

One project had the purpose of evaluating the possibility of creating a shared customer security architecture across countries. The project's QP was organized into specific issues and deliveries such as documents describing issues like ’Security’ and ’Infrastructure’, or deliverables like a ‘Project Charter’. Working on the subject matter of the project requires a great deal of coordination and negotiation of the means and the goals of the project itself. To the members, representing several IT sections, such negotiations can be a delicate matter of strategic disclosure and nondisclosure. When trying to use a QP to support negotiating different solutions to problems, members may not wish to lay all the cards on the table straight away. Thus attempts to use QP for problem solving and negotiation in this project did not succeed, and also attempts to ease coordination have proven difficult. Therefore our observations of the QPs in development projects reveal how they typically resemble project archives, where the results of the projects are developed and maintained in a post hoc manner.

Teams Handling Recurrent Tasks

In Summa a number of teams within the organizational units manage tasks that must be carried out periodically. Teams handling frequent recurrent tasks are often organized as sections within organizational units. In some cases though such teams consist of members that belong to different organizational units. For example this is the case with the information providers and translators handling the task of translating the financial reports that are to be published four times a year for the stock markets. Recurrent tasks typically comprise intense efforts performed over a short period of time, requiring a high degree of coordination and critical predefined procedures. The aim of using QP in this context is mainly to support coordination within the team when performing the task.

Consider the task of producing quarterly financial reports for the stock markets. This comprises production and translation of an English master document into four different languages. The completed financial reports are to be released simultaneously in five languages to the different stock exchanges and the press. The translation is initiated about one week before the release deadline. At this time, the master has not reached its complete and final state and corrections occur several times right up to the deadline. These changes to the English master must be coordinated very tightly and propagated through to the translated versions. The translators work in parallel on the texts in different geographic locations. When a translator has completed parts of the documents, he or she uploads them to QP. They then become available to all others and the status and progression of the work becomes visible in QP. Thus QP provides an overview of the process as well as performing some of the tedious legwork that the collaboration entails. QPs for teams handling recurrent tasks are organized in accordance with their deliveries and they typically also reflect the workflow of the tasks. In this implementation context we found QP's main function to be as a coordination mechanism supporting the coordinating work by mediating mutual dependencies (Pors and Simonsen, 2003).

Summary

From the description so far it is clear that the use patterns are quite diverse. Teams handling recurrent tasks have managed to exploit the technology constructively, primarily due to a number of characteristics that inherently enable its use. While in the other three described implementation contexts the characteristics can to some extent be seen as constraining factors that call for a more deliberate and concentrated effort in order to fully exploit the technology. In the next section we identify and describe these enabling/constraining characteristics in

order to be able to propose strategies for the organizational implementation of CMC technologies.

CHARACTERISTICS OF THE IMPLEMENTATION CONTEXTS

In the following we characterize the four implementation contexts further with respect to managerial potential for initiating, managing, and implementing change related to the implementation of a QP in a distributed organization. Our synthesis from the empirical material has resulted in six overall characteristics of the implementation contexts (Simonsen and Pors, 2003). These overall characteristics are summarized in table 3 below and further described in the following by highlighting similarities and differences across the four implementation contexts.

Context / *Characteristic*	Organizational units	Special interest groups	Projects	Teams handling recurrent tasks
Management position & role	Hierarchical (personnel mgr.)	Network manager (among peers)	Project manager (among experts)	Team manager (personnel mgr.)
Administration of QP	Delegated to member of staff	Network manager	Project manager or deputy	Team manager
Membership	Heterogeneous	Continuous and homogeneous	Transient and temporary	Continuous and congenial
Evaluation and re-design of QP	Occasionally and ad-hoc	Continuous maintenance	Difficult (due to short life cycle)	Regularly (between tasks)
Work practice integration	Low	Low	Medium	High (critical)
Dependency of QP	Nice to have	Nice to have	Nice to have	Need to have

Table 3. Characteristics related to QP use in the four implementation contexts identified.

Management position and role. An obvious characteristic related to organizational change in general is the position and role of management. Organizational units typically have a hierarchical management structure, where managers take on the traditional role of personnel managers. This is not the case with special interest groups. A special interest group in Summa is allocated a network manager supporting and maintaining the group. The network manager is the initiator, administrator, and main contributor to the group's QP. However, the management role is different as compared to the organizational unit because the network managers are among peers when considering the practitioners participating in the group. A somewhat similar situation is found in the projects. While the project manager is in charge of the project, the members of the project team are often specialists and they might also be managers in their respective organizational units. In the customer security architecture project mentioned above, the team members were managers of the IT sections from each of the companies that went into the merger. The teams handling recurrent tasks are comparable to the organizational units: the teams might indeed be organizational units, or the manager of the team is typically a personnel manager within a team where the other members have the status of subordinates.

Administration of QP. Administrators of QP are responsible for configuring and customizing the technology to fit intended goals and requested needs, including setting up the QP on the basis of the initial standard structure, handing out and adjusting user access rights, etc. In organizational units, this task is typically delegated to a member of staff. In larger units this task might be distributed among several persons. Even though QP might have an important signal effect (in terms of supporting the unit's identity etc.), the manager's involvement in shaping QP seldom has his or her primary concern. In the other three contexts, this role most often is taken on by either the manager himself or herself or it is delegated to a deputy working in close cooperation with the manager. Network managers are also QP administrators. The QPs in the projects were typically initiated by the project managers themselves as part of their establishment of the projects. In the teams handling recurrent tasks, QPs take on the role of an important communication tool and a workflow mediator, and the administration of the QP becomes important to keep the structure in place and the content up to date, thus the team manager often takes on this responsibility.

Membership. The users of a QP constitute communities that vary significantly across the four contexts. The size of the group and the varying degrees of clear boundaries constitute different conditions for establishing a common understanding. The members of the organizational unit are characterized by the distributed nature of these units: A corporate unit is typically formed by merging similar units across the different merger companies and appointing one manager in charge of the unit. This community might be viewed as heterogeneous since the employees of the units come from different companies, most of which are still located in the original pre-merger settings. The members of a special interest group constitute a relatively stable and homogeneous network. Even though they are distributed throughout different organizational units they share a specific and highly specialized profession. Thus they may be characterized as a community of practice (Wenger, 1998). The projects have a transient and temporary membership, since a project ends after a limited period of time, e.g. 6 months. Teams handling recurrent tasks have the most stable membership. The fact that these members share the same aim, and that they typically perform the task with tight deadlines, contributes to maintaining congenial relationships among team members.

Evaluation and re-design of QP. The open-ended nature of a QP, along with the continuous changes in the organization, necessitate periodical evaluation and re-design of the QP in order to align the configuration and structure of information in the QP with the agreements and practices related to its use. In the organizational units this seems to happen only occasionally and might for example be triggered by a restructuring of the unit or by a sudden managerial initiative, such as making the QP calendar the default introduction page in order to make the QP members aware of upcoming meetings and arrangements. By contrast, the special interest groups' network manager who is responsible for administrating the QP, approaches evaluation and re-design as part of an overall maintenance which is conducted in a continuous manner. Re-design within projects is difficult and problematic simply due to the relatively short life cycle of the projects. The initial setup of a QP is thus usually rarely re-designed: The cost of getting acquainted with a new structure is most often considered too high seen in relation to the short time that the team might yield the benefits from this. The teams handling recurrent tasks have a periodically occurring opportunity for reconsidering the use of QP where former experience can be incorporated in the future routines. The recurrent task thus has an advantage in this respect, since it provides such frequent occasions for evaluation and re-design, and because the character of work is well defined and has been tried several times before within a stable membership of a limited size.

Integration with work practice. Successful use of IT in general, including CMC technologies, often depends on how tightly these technologies can be integrated with the work practice of the users. It is generally acknowledged that integrating a CMC technology, such as QP, with work practices is challenging and a demanding task requiring that users are able to see the benefits from its use, and that they choose QP instead of other well established alternative technologies such as email (Grudin, 1994). In our study we observed QP's integration with work practices in the organizational units as low reflecting the overall aim of offering QP primarily as an information distribution channel and as a shared archive. This is also the case for special interest groups, where the focus on general issues of interest leads QP to have a secondary role when compared to the daily work for the members. The integration varies in projects. Projects might succeed in integrating QP into their work by for example using QP as a working library for object oriented use cases. In most projects, though, the main use of QP remains as an archive for project documentation with little integration with work practices, except for the project manager. On the other hand, the QPs of the teams handling recurrent tasks show a very tight integration with work practice. The ways of coordinating work are well defined and shared among the members, giving an effective basis for using QP as a coordination mechanism. Changes to established agreements have to be carefully prepared in advance, allowing for the necessary coordination and avoiding any misunderstandings or other disruptions in the completion of the task.

Dependency of QP. The dependency of having access to a QP in a given context reflects the integration with work practice. For the organizational units and the special interest groups, it is generally a nice-to-have facility, and work will continue (with only a few irritations) even if the QP server (theoretically) should crash and be out of use for days. This would also be the case for most projects, where the typical project manager needs QP when managing issues and deliverables and where QP is mostly viewed as a nice-to-have service for the project members. In order to get their work done, other means for coordinating project work such as email and phone calls might even be more immediately gratifying. Dependency on QP is highly critical when considering teams handling recurrent tasks. When the team producing financial reports finalizes the quarterly translation task, this work is considered so critical that the QP server in Summa and central network facilities enters a 'frozen zone mode' where other systems are restricted from certain kinds of updates in order to minimize the risk of a server crash.

THEORETICAL MODELS

A large body of research is devoted to studying the diffusion and assimilation of technologies in organizations and in societies in general. Fichman (2000) characterizes two strains of research in this field. The first strain is characterized as research identifying factors relevant for the rate, pattern, and extent of diffusion. Rogers (2003) has formulated one of the central theories, the diffusion of innovation theory, which has guided much of this research. The second strain is research aiming at identifying factors relevant to the diffusion and assimilation of technologies in organizations - in general and for specific technologies. The technology-acceptance model (Davis, 1989) is a classical example of such a theory.

The diffusion of innovation theory is being used intensively to study the diffusion of information technologies, and is also being used as a framework for understanding the adoption of new technologies in organizations, see Prescott and Conger (1995) for an early

overview. With the classical diffusion of innovation theory the relation between the technology and use is a binary one - either the technology is adopted, or it is rejected. We should note that the diffusion of innovation theory to some degree does acknowledge that a technology might be changed during the adoption process, captured by the concept *re-invention* (Rogers, 2003). However as we will see, the situation with an open and flexible CMC technology like IBM Lotus QuickPlace is more complex. Many studies have shown the value of the diffusion of innovation theory and the technology-acceptance model in explaining individual acceptance of technologies for personal use where the individual has a free choice of whether to accept the technology. But studies have also demonstrated limitations in terms of misfits between the assumptions underlying the models and the actual technology (Gallivan 2001, p. 55).

Based on a thorough review of literature on diffusion and adoption models, Gallivan (2001) develops a framework for studying and analyzing the implementation of complex technologies in organizations when there is an organizational mandate to adopt the innovation. Gallivan's approach acknowledges that the organizational context of adoption decisions is not well captured by the traditional models, be it the diffusion of innovation theory or the technology-acceptance model. His theoretical framework is based on a two-step decision process, the initial decision being taken by an authority at organization, division, or department level, and the secondary adoption process following one of three paths: (a) total commitment – a mandate that the innovation be adopted throughout the organization, (b) support strategy – the necessary infrastructure is provided while the adoption is voluntarily, or (c) advocacy strategy – based on specific pilot projects, observations of their processes and outcomes, decisions are made whether to implement more broadly.

Gallivan's model focuses on the factors influencing the secondary adoption process, and includes a *feedback loop* between what he terms the organizational consequences and the secondary adoption process with the assimilation stage. The content of this feedback loop, which Gallivan does not elaborate on, is intrinsically relevant when the technology in question is highly open-ended, configurable, and context-specific. In some of the local settings we studied in Summa, experience from using QP provides feedback to make re-configurations of the technology and thus creates input to iterations of the secondary adoption decision. Refining Gallivan's model with respect to this feedback is vital in relation to such open-ended CMC technologies. Especially, we find that the various implementation contexts provide quite different settings and possibilities for this feedback.

Orlikowski and Hofman (1997) suggest a different approach resting on the assumption that changes associated with the implementation are ongoing processes, and that the changes cannot all be anticipated or planned in advance. They suggest distinguishing three kinds of change: anticipated change, emergent change, and opportunity based change. Our studies clearly demonstrate the validity of Orlikowski and Hofman's improvisational model of change management (Orlikowski and Hofman, 1997). We can identify change processes of all three types: *Anticipated change,* i.e. change that is planned ahead and occurring as intended by the originators of the change, is for example the use of QP in organizational units and projects. *Emergent change*, i.e. local and spontaneous change not originally anticipated or intended, is exemplified in our study by a QP that was started by a newly formed group of people assigned to gather investment risk data from different business units. They started using the QP as a repository where the people involved posted Excel spreadsheets of risk data, which was consolidated into one risk profile for Summa. They thus used QP to support a recurrent task. Such changes did not involve deliberate actions but grew out of practice. The last kind of

change identified by Orlikowski and Hofman is *opportunity-based change*, i.e. purposefully introduced changes resulting from unexpected opportunities that arise after the introduction of the new technology. An example of this kind of change is the use of a QP to support the translation of quarterly financial reports. The idea of using a QP to support this activity appeared as a possibility to the manager of the team of translators. Since email was too insecure for distributing financial draft reports, the team used the fax machine for this purpose. QP offered an alternative secure medium for this distribution. The manager then introduced a QP to the team and carefully designed the structure of the QP to support the progression of the translation process.

Organizational Change Management Levels

With a technology like IBM Lotus QuickPlace, the change processes involved in the integration of a QP into the organization can be understood as taking place at two very different levels. Gallivan's model identifies a two-step adoption decision process (Gallivan, 2001), which in relation to the Summa case relates well to changes at the two levels. At one level – in Gallivan's model called the primary authority adoption decision – we can identify the decision to acquire IBM Lotus QuickPlace followed by the introduction of the QP service. The change at this level we call an *organization/infrastructure change*. At another level we find the local change processes related to the introduction of the individual QPs and the dynamic reconfigurations among the users of a QP, which we coin *work group level changes.* In Gallivan's model this is referred to as secondary adoption and organizational assimilation processes. In relation to Gallivan's model we should keep in mind that in Summa the decision to use QP on the level of the work group – be it an organizational unit, a project, or a team – is a voluntary decision.

Thus, in order to better understand – and thus better plan and manage – the implementation of CMC technologies like QP we suggest a model combining the distinction between an organization/infrastructure level and a work group level with Orlikowski and Hofman's approach recognizing changes as ongoing processes of three types – anticipated, emergent, and opportunity-based. As argued previously the centralized introduction of the general CMC technology and the adoption of individual QPs (in for example a project) are very different change processes. Yet they are equally important. Examples of the changes processes at organizational and group level are provided in table 4.

	Organization/infrastructure level	Work group level
Anticipated change	defining goals such as to use QP to reduce travel ; establishing procedures for issuing, setting up and closing QPs	defining and agreeing on the group's aim of using a QP, defining folder structure, inviting members, managing content and re-configuring
Emergent change	change of criteria for opening a QP from including a business justification to geographical dispersed groups	the establishment of new communication patterns over time (e.g. using a QP to support gathering risk data)
Opportunity-based change	introduction of new generic services in QP like e.g. archiving functions, search patterns, or various templates	using the QP for supporting the translation of financial reports as a secure technology replacing the fax machine

Table 4. Examples of change processes at organization and work group level.

Activities at both levels are central to the fruitful implementation of flexible CMC technologies. An implication of this distinction is that it could help an organization understand, foresee, and support a wider spectrum of the change processes involved in implementing CMC technologies in particular by directly addressing the work group level. One way of achieving this could be to systematically collect good practices from individual QPs and distributing this advice to others. For example, in a particular QP some had discovered a shortcut to reverse the order in which documents appeared in a folder. Other users in QPs with comprehensive and cluttered folders could have benefited greatly from this. Such a sharing of experience outside closed circles is an important prerequisite for enabling emergent and opportunity-based change. Thus a general guideline drawn from our studies is to encourage and provide resources for evaluation throughout the organization by collecting and disseminating accounts of good practices regarding CMC use.

The overall situation in Summa concerning the implementation of QP is characterized by a rapid, although not well supported spread of the technology, where the configuration and customization of the local QPs are distributed to the users of the technology. QP might in this way be considered as a non-strategic CMC technology that spreads 'bottom-up' and develops into different local guises. An improvisational change management approach is needed relying on anticipated as well as emergent and opportunity-based change processes as suggested by Orlikowski and Hofman (1997). This makes the first three mainly organization-oriented characteristics (table 3) of the implementation context (management position and role, administration of QP, and membership) hard to change without the need for investing resources in, for example, major managerial and organizational restructuring that exceed the perceived returns of such an investment. For example, we consider the role of management within special interest groups and projects to be a fixed condition that prevents management from relying on authority (alone) to promote specific uses of QP. A specific way of using QP must be argued in relation to actual needs, as they are experienced by the users, in order to be successfully adopted. Thus it is not considered realistic to initiate changes within these organization-oriented characteristics solely in order to obtain a shift from a nice-to-have to a need-to-have use of QP. The latter three work practice-oriented characteristics: evaluation and

re-design of QP, integration with work practice, and dependency of QP, might in this respect be more fruitful to consider initially.

Synthesizing Strategies for Organizational Implementation

Below we refine and operationalize Gallivan's approach, especially with respect to its feedback loop, as well as Orlikowski and Hofman's improvisational change model and describe strategies for organizational implementation based on the four typical implementation contexts as they appear in tables 3 & 5. The strategies synthesize our studies and empirical experience with regard to open-ended CMC technologies. Each of the four contexts is characterized with regard to the challenges that management face concerning the characteristics of the implementation context, the immediate expectations and aims that management can have for the effect of implementing CMC technologies in a given context, as well as the strategies to stimulate change by means of enabling anticipated and opportunity-based change processes.

Organizational units. Most characteristics (see table 3) do not support extensive use of QP. The focus is on clarifying and establishing processes and collaboration across the units' distributed sections, rather than supporting existing work practices by integrating QP. A potential strategy for change could include aiming for a comprehensive shared archive. This requires a well planned process of anticipated change: developing a comprehensive and shared categorization system for the archive, established by regular evaluations and re-designs. If parts of the organizational unit over time evolve into specialized sections and teams, an opportunity-based change process could be initiated including sub-structures with 'private' folders. Such specialized sections might finally resemble teams handling recurrent tasks, and (like the group of translators) teams within the unit might thus use QP to support coordination of their work.

Context *Organizational implementation*	Organizational units	Special interest groups	Projects	Teams handling recurrent tasks
Challenges	Most characteristics do not support effective use of QP	Low integration with work practice (no specific collaboration among members)	Transient, temporary membership combined with short life cycle	No serious challenges: All characteristics support effective use of QP
Immediate expectations and aims	QP as information distribution channel with low effect on collaboration	QP as information distribution channel and 'information of interest' archive	QP as information distribution channel and post-hoc project documentation archive	QP as coordination mechanism effectively reducing complexity in collaboration
Strategies to stimulate change processes [A]: Anticipated [O]: Opportunity based	[A]: QP as shared archive developed by regular evaluations and re-designs [O]: QP use reflecting teams handling recurrent tasks as such teams evolve	[A]: QP as means for promoting 'best practices' [O]: QP as indispensable tool provider integrated with daily work practice	[A]: QP as a strategic application across projects, supporting (mandatory) concepts, models, tools, techniques, and deliveries	[O]: QP as local strategic application, requiring full commitment to using QP and aligning work practices to obtain tight integration

Table 5. Organizational implementation of QP in distributed organizations outlining challenges, immediate expectations and aims, as well as strategies to stimulate change processes, as related to four types of implementation contexts.

Special interest groups. The members within a special interest group potentially do share a professional interest, but this does not entail any specific collaboration or mutual dependencies. This hinders integration of QP and work practices, and the need to use QP is therefore modest. Expectations for using QP to reach beyond a 'nice-to-have' facility depend on the possibilities for a more tight integration of QP with the daily work practices of the group members. Two potential strategies might be considered, a 'tool' strategy and a 'best practices' strategy. Developing the technology into an indispensable tool requires that opportunities arise where QP might provide functionality that is more closely integrated with daily work practices, for example, by offering resource management services for the project managers, by creating mutual commenting and editing procedures for the change consultants, by providing facilities for software configuration management for the Java developers, etc. Promoting and establishing so called 'best practices' requires an anticipated and ambitious change strategy with wide-ranging implications, including requirements for an organizational transformation of the groups into single, uniform entities, or coherent communities of practice, as suggested by Bansler and Havn (2001).

Projects. The immediate challenge related to projects is to deal with the risk of investing in establishing and maintaining a QP in a situation that can be characterized as a temporary endeavor involving busy project members, and hereby gain advantage from the investment. Transient and temporary memberships combined with short life-cycles are characteristics that seriously restrict ambitious use of CMC technologies beyond a 'nice-to-have' system. Establishing a QP as a 'need-to-have' coordination mechanism within a specific project requires that the collaboration between mutual dependent project members has been established, that a general need to reduce the complexity of collaboration has been experienced and recognized, and that the QP is designed and configured to support the collaboration. This is almost impossible within a short time frame. A realistic expectation for a project is using QP on a relatively low ambition level as an information distribution channel and as an archive for project documentation. Strategies for a more ambitious use of QP, such as using QP as a coordination mechanism, should include elements that project members recurrently face in every consecutive project. This could include support for concepts, project models, selected tools and techniques, and deliverables that are required in all projects. In this way, QP could be turned into a strategic application that supports using and coordinating shared (mandatory) elements across projects. In a longer perspective, consecutive projects might in this way resemble teams handling recurrent tasks. Such an initiative could be supplemented by allocating change agents that evaluate use of QP across several projects, identify opportunities and emergent practices for QP use, and support the disseminating and handing over to new projects.

Teams handling recurrent tasks. This is the only implementation context observed in Summa where QP has evolved into a critical technology having the effect of seriously reducing the complexity involved in communication and collaboration within a geographically distributed team. All aspects of the special characteristics of this implementation context are inherently in favor of using QP. Recurrent tasks with an embedded feedback loop naturally open for opportunities to reflect on and further develop procedures and practices for using QP as well as re-configurations of the QP. The strategies for an ambitious and successful use of QP for recurrent tasks include a full commitment to the technology and potentially a dramatic change in work practices in order to obtain the opportunities. Supporting the mutual dependencies embedded in a coordination mechanism also differentiates this implementation context from the other three by establishing a situation where a CMC technology develops into a local strategic application.

CONCLUSION

In this chapter we have presented results from an empirical study of the use and implementation of a particular CMC technology, a commercial virtual workspace product used to support communication in a distributed organization. We saw that the implementation contexts were quite diverse, and we further offered six characteristics as essential factors in understanding the implementation of open-ended and flexible CMC technologies: management position and role, administration, membership, evaluation and re-design, work practice integration, and dependency.

Combining Orlikowski and Hofman's improvisational model for change management (Orlikowski and Hofman, 1997) with Gallivan's elaborate model for organizational adoption of complex technological innovations (Gallivan, 2001), we identified typical changes of three

types – anticipated, emergent, and opportunity-based change – at two levels: an organization/infrastructure level where the introduction of the technology is prepared, and a work group level where the particular application close to the existing work practice takes place. Linking these change management models to the findings from the empirical study, we synthesize implementation strategies on the premise, that these levels are mutually interdependent. Organizational units might evolve and include sub-units with local teams handling recurrent tasks, while special interest groups might be highly organized. Effective use of CMC technologies, however, is dependent on the possibilities of providing indispensable tools integrated with local daily work practices. We have identified that the special characteristics of technologies for networked communication entail successive changes including configuration and re-configuration of the technology used in local organizational contexts. In this light the options for organizational implementation are further operationalized by identifying challenges, immediate expectations and aims, as well as strategies to stimulate change beyond the immediate effects of implementing CMC technology.

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