Implementation of Groupware Technology in a Large Organization – implications from an empirical study

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Abstract
This paper is based upon an extensive empirical study of the introduction and use of a groupware application in a large organization. The implementation of the groupware raised a number of conflicts in the organization and it was only partially adopted. We discuss how a model of implementation and change management, which introduces a distinction between an organizational/infrastructural level and a group level perspective might improve how generic technologies for communication and collaboration are adopted in organizations.

Keywords: Virtual Workspaces, Groupware, Implementation

1 Introduction

We have studied the introduction and use of a groupware product, Lotus QuickPlace™ – a virtual workspace product from IBM - in a large Scandinavian financial organization through a period of one year. Virtual workspaces are applications based on web-technology for supporting communication and collaboration between geographically dispersed groups working together in a project or a team. Examples of this type of product are Lotus QuickPlace (www.lotus.com/quickplace), BSCW developed at GMD (www.bscw.gmd.de), and eRoom (www.eroom.com). Virtual workspaces are open and flexible technologies with no specific work processes built in. As such they offer support for many different occasions. One such occasion occurred when a large financial company was created in Scandinavia by a merger involving financial companies (banks and insurance companies) in four Scandinavian countries. The new company, in this paper referred to as Summa, needed an application to support the collaboration and communication, which took place in the newly established organizational units as well as in merger projects. New organizational units were formed at head office level typically with employees from four countries. There was a real and perceived need of supporting communication and coordination in these new organizational units. Lotus QuickPlace was deployed approximately one month after the merger as a mean to support this end.

Lotus QuickPlace is a flexible technology, which offers users a web-based shared workspace (called a QuickPlace, hereafter QP, while we refer to the product as a whole by LQP) with a folder structure, notification functions, support for custom document types and support for simple workflows. It was originally developed as an Application Service Provider (ASP) application and is thus very decentralized. Lotus QuickPlace presents itself on the web as being very easy to implement - "create a Team Workspace on the Web - Instantly" and "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" (Lotus Quickplace 2001). In line with this, the implementation process of the technology in Summa was lightweight - no education and no guidelines but the ones on the manufacturers' web site.

As known from the literature, the implementation of this type of technology is often difficult. CSCW researchers like Bullen and Bennet (1990), Orlikowski (1993), and Grudin (1994) have identified technological as well as organizational and social factors influencing the implementation. Grudin (1994) for example discusses eight challenges, or problem areas, facing developers of groupware - including a call for attention to the adoption process. According to Grudin groupware requires a more careful implementation in the workplace than product developers have confronted - implying that consultation on how to use the product should go hand in hand with the acquisition of the product, and/or be integrated in the product (built-in support).

A large body of research is devoted to studying the diffusion and assimilation of technologies in organizations and in society in general. Fichman (2000) characterizes two strains of research in this field. The first is characterized as research identifying factors relevant for the rate, pattern, and extent of diffusion. Rogers (1995) has formulated on of the central theories, the diffusion of innovations 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.

A related strain of research, which is more pragmatic and operational, regards the implementation processes and the management of change. The traditional model for managing change, which has received numerous critiques, suggests managing change in three processes: unfreeze-change-refreeze (Kwon & Zmud 1987). Orlikowski & Hofman (1997) has provided a more recent model, which seems more appropriate for the kind of technology discussed here.

In the paper we describe the implementation process of LQP in Summa and some of the problems encountered, and provide a suggestion for extending Orlikowski & Hofman's model to fit the configuration of organization and technology encountered in our case. Although we do not think of the implementation of LQP in Summa in terms of failures, our goal can be compared to that of Dalcher (2003): to provide narratives or descriptions of cases about development and use of information systems in organizations in order to contribute to learning about the relations between information technologies and organizations, cf. also (Rose, Jones and Truex, 2003).

The paper is structured as follows. In the next section we describe the research from which we draw empirical findings in this paper. Section 3 contains a description of the application and its implementation in Summa. In section 4 we present a brief description of some implementation models from the literature, specifically Orlikowski and Hofman's improvisational model (Orlikowski & Hofman 1997). We then relate to our findings from the implementation efforts in Summa to the model. Section 5 concludes the paper.

2 Research Context

The paper draws on data from an extensive case study of Lotus QuickPlace in Summa. The first part of the case study was primarily based on semi-structured interviews with managers and users from three selected QPs and with persons involved in the implementation process (in total 10 interviews were carried out). In addition it also involved analysis of the technology, and an analysis of the documents in the three selected QPs. Later the case study was supplemented with a questionnaire and an analysis of server log files. Results from each

part of the study have been reported back to the company for feedback and focus of follow-up activities.

The interviews were all conducted in a three-month period in spring 2001. They involved managers and users of three selected QPs: one used by a post-merger technological infrastructure project and two used in the Communications Department. The interviews were semi-structured interviews lasting 1 to 2 hours, guided by an interview guide, tape-recorded, and later transcribed ad verbatim. The interviews were further analyzed using the affinity diagramming technique (Beyer & Holzblatt 1998). The document analysis comprised descriptions of all QPs resident on Summa's QP-server at the beginning of our study, and an analysis of the structure and contents of the studied QPs.

Logging of all http transactions to and from the QP server was initiated at the beginning of our study and continued through the following ten months. The log entries show the various operations on the content of the QPs involving http-transactions between the user's web-browser and the QP-server - such as when documents are created, read, or edited; and by whom.

In fall 2001 an investigation based on an electronic questionnaire was carried out. We sent out invitations to 123 managers of 77 different QPs. 56 managers from 53 QPs responded - corresponding to a response rate of 45% of the QP-managers covering 69% of all QPs. 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.

3 Lotus QuickPlace and its implementation in Summa

In this section we describe Lotus QuickPlace and its implementation in Summa. In particular we focus on areas where the implementation has conflicted with IT management policies in a large organization like Summa. We then continue into a discussion of how a different perspective of the system could help improve its implementation.

Lotus QuickPlace is a virtual workspace application. Virtual workspaces are standard applications for collaboration and communication in small teams. Like other virtual workspace products, Lotus QuickPlace was originally designed and developed as an ASP (Application Service Provider) application. In the ASP environment either the software developer or a third party hosted the application, which was then rented by customers on a per-use basis. This background gives the application some basic characteristics:

- Lotus QuickPlace is very open in terms of which kinds of collaboration it supports. There is no suggested workflow inscribed in the application for example to support projects, recurrent tasks, interest groups etc. The members of a virtual workspace like 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 & Simone 1996).
- A second characteristic originating from its origin as an ASP application is the distributed security infrastructure. There is no central system administrator with extensive access rights. And there is a very flexible way of controlling the number of users of the QP. Any manager of a QP can set up a room, and invite others to participate in this room - as managers, authors or readers.

These characteristics make the software both cheap to purchase and apparently easy to implement in an organization. Once the QP-server is installed, the QP managers can set up particular QPs by defining the structure – rooms, folders, document types, as well as access rights to each room and folder. Each QP thus consists of a number of rooms with folders containing documents, which can be reached by a single URL, for example provided in an email notification. The access to specific documents for users is defined partly by the managerially defined access to rooms and folders, partly by the author (access to individual documents as well as rights to edit individual documents).

The decision to introduce Lotus QuickPlace to support the post-merger organizational units and projects in Summa was done quickly without thorough studies of needs and possibilities. QP was a "quick and dirty" solution: it was web-based, needed no integration with the existing IT security infrastructures of the pre-merger companies, and could thus be implemented very quickly. One month after the merger, the Communications Department was commissioned to distribute LQP in Summa. Some resources were spent on customizing the look of the application, but apart from that the only formal means of implementation was an email to potential QP managers and oral communication. A potential QP manager should send an email to IT Operations applying for a QP. The original idea was that the application should contain a business justification, but in practice all applications were approved. As part of our studies, we analyzed the applications for the first 90 QPs, and there are only very few formal applications which actually describe the business purpose of opening the QP. The rule of thumb for granting an application for a QP has been that the use was justified when there were members from geographically dispersed organizational units or project teams.

Our study showed that the number of active QPs had been growing steadily within its 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. Table 1 summarizes the development in activity over the period, in which we studied 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 10 month period in Summa

The study also showed that the application was used for quite different purposes: To support communication and coordination in organizational units, to support different recurrent tasks like translating the quarterly financial reports and the corporate newsletter, and to support communication and coordination in projects. One QP was even used as a local intranet with almost 300 active users.

The detailed study of QP usage revealed that in most cases, the potential of the technology was not utilized. An analysis of the activity in the QPs, which were started during our 10-month period of study, showed that 14 of 37 QPs, or 38%, only showed very fragmented use, or no use at all. While all 14 were based on a conscious decision to start using a QP, it did not result in a sustained use of the technology. Studies of the lifecycle of individual documents in QPs showed that 72% of the documents were stored there - without ever being read again in

the period. It also revealed that the facilities for collaboration on documents – supposedly one of the advantages of the virtual workspace technologies – were only utilized in extremely rare cases (0,3% of the sample of documents). More detailed reports on the uses of QP can be found in (Bøving 2003, and Bøving & Bødker 2003).

3.1 Implementation conflicts

After the first round of interviews the Communications Department – the unit which commissioned the use of LQP - told us that LQP was probably going to be closed down. This was due to a missing approval from IT Security. According to IT Security, LQP had some features violating Summa's IT security policy. When a new QP is created, at least two QP managers are assigned centrally by IT Security. Hereafter, the appointed QP managers define the structure of the QP and define access rights for different users to different parts of "their" QP. The author of a document, however, solely defines who is able to read and edit it. This distributed security model also enables a manager to create new "sub-rooms" potentially without access for the other QP manager(s) originally appointed by IT Security. It is obvious that LQP hereby compromises the hierarchical and centrally managed security model normally used in Summa. The central security unit, IT Security, does not have any way of controlling access to rooms or documents, nor does a QP manager have any means of controlling what is in "his" QP, or have access to all documents.

Eventually LQP was not shut down. A compromise was agreed where IT Security took over issuing QPs. A main reason that QP stayed in the organization was the fact that at that point in time there were a little more than 80 active QPs. It was practically impossible to shut it down. Some of the activities supported by a QP, like the translation of the quarterly financial reports, were indeed business critical. Shutting it down would have created a lot of disturbances, and would have required an alternative technology.

The management of Lotus QuickPlace has caused a number of other conflicts. In Summa, as well as in the pre-merger companies, each IT-system has a system owner. The system owner is typically the manager of a business unit responsible for the system. The responsibility of the system owner is to define the purpose of the system, and rules for its proper use. However, it has been rather difficult to find someone willing to play the role as system owner of LQP. This is due to the difficulties of exercising the system owner's role in LQP because of its decentralized and distributed security structure. In LQP there is no surveillance functionality. As mentioned, LQP was originally designed as an application for an ASP environment. As a customer leasing a QP in an ASP environment, the last thing you would like is for some system administrator to have unlimited access to your documents. For that reason nobody but the managers of the individual QP have access and define who should have access to their QP and the various rooms in the QP. Thus, the system owner role used in Summa is not very useful for LQP, as it is reduced to formulating criteria for starting and closing down QPs.

As to how managers should set up and use the QP, they were left with the general guidelines provided by the software manufacturer. QP managers were referred to the general guidelines provided by the software manufacturer and available via the www (Lotus Quickplace 2001). There was neither educational effort of users, nor any guidelines as to how the QP could and should be used to support various communicational, coordinative and collaborative needs. This strongly contrasts other IT systems in Summa. IT systems in Summa have a Standard Operating Procedure (SOP) attached to its use. For each IT system put to use in Summa, the system owner writes a SOP. The SOP contains guidelines on how the system should be used, as well as the rights and responsibilities of the various roles and user groups. In the case of

LQP it has taken more than one year to come to an agreement about a SOP. It has been very hard for the Communications Department and IT Security (responsible for the implementation) to actually formulate a SOP for an open technology like LQP. One year after LQP was introduced, a 5 page SOP was issued containing information about how to open and close down a QP.

3.2 Implications for improving practice

We have described how LQP has created difficulties for Summa in terms of its security structure, finding a system owner, and formulating a SOP. How can we account for these problems? As described above the implementation effort of Lotus QuickPlace in Summa was rudimentary, especially when contrasted to the way one of the pre-merger companies previously implemented an intranet. Intranets have in some organizations been established by "grass-root efforts", or as bottom-up approaches by integrating local sub-intranets into a company-wide intranet (Bansler et. al. 2000, Lamb & Davidson 2000). This was however not the case in the pre-Summa company. The intranet implementation, managed by the Communications Department, implied defining a number of communication channels, as well as roles (editors, authors, and readers) and workflows for publication of documents within the channels. The implementation of the intranet included a formalized education effort where a large number of editors and authors in two-day seminars learned about system features as well as how to write for the new medium, and where all readers were introduced to the intranet by video-presentations.

In contrast to the intranet implementation there was neither educational effort of users, nor any guidelines as to how a QP could and should be used to support various communicational, coordinative or collaborative needs. Users were left with the general guidelines provided by the software manufacturer as to how they should set up and use the QP. As noted above, creating and setting up a QP is by default distributed to the manager(s) of the QP. The QP managers define the initial structure (rooms and folders) of the QP and the authorization structure. In all cases an important precondition for a QP to work is that the users of the QP must come to an understanding of:

- The purpose for which they want to use QP,
- How the QP should be structured to support the intended use (“the content”)
- The work flow of using the QP as intended (“how to use it”) (Simonsen & Pors 2003)

One obvious conclusion from this is that Summa’s implementation effort did not fit a product like LQP – it simply overlooked the activities necessary at the level of the individual QP to establish usage, and thus did not support them. In fact one may argue it worked against it, as the traditional implementation model has created expectations among some users that proper use and justification of use is defined by the system owner and accompanied by a formalized education effort. When this did not happen, some users “missed” the opportunity to get to learn about the features of the new application. And, as we have seen above, the QP application implicitly includes assumptions that the group of potential users of a QP come to an agreement that a QP should be used, for what it should be used, and how it should be used. This has led to a situation where the application’s potentials are far from fully exploited.

What we see is a tradition, or a policy, of centrally managing both technology and the use of the technology in Summa that conflicts a product like LQP. Summa's implementation model is not geared to handle a technology like LQP where both access rights, decisions about what the system should be used for, and how it should be used is defined at the level of the individual QP. In fact, we can see that the implementation of a QP takes place at two different

levels. There are activities at an organizational level to establish the QP-server, initiate the individual QPs, etc., i.e. establishing the infrastructure at a server level. And there are activities at a local level, or a group level, when an individual QP is set up, i.e. defining its structure and access rights, and the dynamic reconfigurations of the structure and content when the QP is in use. We can thus explain Summa's problems with LQP as being caused by only identifying and providing guidelines for the organization level of implementation, and - by focusing only at their normal implementation model - ignoring activities at the group level.

In retrospect we can say that Summa to some extent failed to understand what kind of technology they were dealing with. They treated it as a traditional bank IT application with a system owner controlling the use, and a SOP for its proper use. Hereby, the open-ended nature of the application is not well captured, which for example is illustrated by the problems in formulating a SOP for the system. Understanding LQP as a general and open-ended infrastructure where the concept of a SOP is only meaningful for each application of QP seems more fruitful. With the understanding of QP as a traditional IT application follows the intended use of traditional IT management, or implementation, models that only provide very superficial guidance for the implementation process for LQP. With this understanding we can identify a plausible explanation as to why the features in LQP for supporting collaboration are far from fully exploited.

Our line of reasoning involved two steps; the first being the identification of an almost classic clash or conflict between a centrally controlled implementation effort not well suited to the application in question. In the case of LQP in Summa this conflict involved three important aspects, the security structure, finding a system owner and formulating a Standard Operating Procedure. The effect of this conflict was serious; IT Operations came very close to closing down the system. The second step in our reasoning was the identification of the effects of applying Summa's traditional implementation model to the implementation of LQP: by not supporting the change processes in relation to using QP in a particular work context, called the group level change processes, the potentials of LQP became - so far - far from being fully exploited.

One characteristic of these kinds of open systems for communication and collaboration is that their use patterns are very hard to plan or predict. When e-mail was introduced, nobody imagined the diverse communication patterns that have emerged. Virtual workspace applications seem in this sense to resemble e-mail much more than they resemble traditional business IT applications.

4 implementation of open and flexible technologies

The implementation of groupware to support communication and collaboration is by no means always successful (Orlikowski 1993, Grudin 1994, Olesen & Myers 1999, Fjermestad & Hiltz 2000). Olesen and Myers (1999), for example, report on a failed action research project, which attempted to improve communication and collaboration in a management team with a real need for such support, and with strong support from senior management towards radical changes of coordination within the group. Olesen and Myers attribute the reasons of the failed project to institutional forces, which inhibited dramatic changes in work habits. Other researchers have reported similar and other concerns with implementation of groupware - identifying technological as well as organizational and social factors (Bullen and Bennet 1990, Orlikowski 1993, and Grudin 1994).

Introducing IT in an organization has been researched under different labels such as diffusion (e.g. Rogers 1995), infusion (e.g. Massetti & Zmud 1996), adoption (e.g. Davis 1989), assimilation (e.g. Fichman 2000), and change management (e.g. Kwon & Zmud 1987). Change management models have been proposed in the literature as analytic tools to describe actual implementation processes, or as more prescriptive tools to guide an implementation effort in practice. The traditional model of change management sees change as something following an *unfreeze-change-refreeze* model (Kwon & Zmud 1987). *Unfreezing* is the phase of motivating people and creating a readiness for change. *Change* is the process of actually implementing the change, and *refreezing* is the process of consolidating the change and return to some new equilibrium. This approach has been criticized as inappropriate in the turbulent conditions that most modern organizations face, or when introducing open-ended and context-specific technologies like groupware (Orlikowski & Hofman 1997).

Orlikowski & Hofman (1997) suggest a different approach suitable for open technologies like groupware. Their approach rests on the assumption that changes associated with implementation of groupware are ongoing processes, and that the changes cannot all be anticipated or planned ahead of time. They suggest distinguishing three kinds of change: anticipated change, emergent change, and opportunity based change. *Anticipated change* is planned ahead and occurs as intended by the originators of the change. In the case of Summa, the anticipated change is e.g. the establishment of the routines for applying and creating new QPs, as well as the use of QP by new organizational units and merger projects to support communication and coordination in order to minimize travel. *Emergent change* is defined as local and spontaneous changes, not originally anticipated or intended. Such changes do not involve deliberate actions but grow out of practice. In our study a QP was started by a small group of people, which gathered 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 recurring business process. The last kind of change identified by Orlikowski and Hofman is opportunity-based change. *Opportunity-based changes* are purposefully introduced changes resulting from unexpected opportunities that might arise after e.g. the introduction of a new technology. For example the use of a QP to support the translation of quarterly financial reports for the stock markets (to be published at exactly the same time in four Scandinavian stock exchanges and thus in four Scandinavian languages and English) appeared as a possibility to the head of the group of translators. The structure of the QP was then carefully designed to support the progression of the translation process.

While the Orlikowski and Hofman approach recognizes changes as ongoing processes consisting of shifts between anticipated, emergent and opportunity-driven changes, and that various technological and organizational changes made during the ongoing process cannot, by definition, all be anticipated ahead of time, it fails to grasp fully the QP challenge described in our case. With a technology like QP, the change processes involved in the integration of QP into the organization as mentioned earlier can be understood as taking place at two very different levels. At one level there is the introduction of the LQP service, which we choose to call an *organizational/infrastructural change*, and at another level there are the local change processes related to the introduction of the individual QPs and the dynamic reconfigurations, which we coin *group level changes.* Thus, in order to better understand – and maybe thus better plan – the implementation of open-ended and context-specific technologies like virtual workspaces we suggest the introduction of a distinction between an organizational/infrastructure level and a group level perspective. As argued previously the centralized introduction of the QP service and the adoption of individual QPs in e.g. 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 2.

	Organizational/infrastructure level	Group level
Anticipated change	Processes for issuing, setting up and closing QPs, QP-server infrastructure, defining goals such as to use QP to reduce travel	Defining folder structure, inviting members, agreeing on the use of individual QPs
Emergent change	Change of criteria for opening a QP from including a business justification to geographical dispersed groups	The partially unreflected establishment of new communication patterns over time (e.g. the development of an archive of presentations in a QP, or the use of QP to support gathering risk data.)
Opportunity-based change	Introduction of new generic services in QP like e.g. archiving functions or search patterns	Using the QP for supporting a specific work process (e.g. translation of financial reports)

Table 2 Examples of change processes at organization and group level

One could argue that what we call group level changes is captured by the emergent change category in Orlikowski and Hofman's model. However, characterizing implementation of individual QPs as emergent changes ignores, or downplays, their importance, as well as the possibility of facilitating the planning of group level changes. We find the group level activities to be central, cf. our earlier argumentation that by ignoring these activities, Summa's implementation efforts did not support the local implementation of the technology. Introducing a distinction between organizational and group level change processes imply that the group level implementation is made visible. This could help an organization like Summa understand, foresee, and maybe support a wider spectrum of the change processes involved in introducing LQP. For example, identification of the important group level change processes could have helped Summa create an environment supporting these change processes - for example to establish a unit or a group to collect experience from individual QPs and distribute advice to others. It would also have helped Summa realize that a SOP for QPs is only meaningful for issues related to the organizational/infrastructure level.

By introducing a distinction between organizational and group level changes we are furthermore able to identify a dynamic, mutual relationship between activities at the two levels. One the one hand, organizational level activities are essential and necessary for the group level changes. An obvious example is that a local QP would only be possible with a server infrastructure. On the other hand, activities at the organizational level only, would never lead to the desired changes. This resonates well with Gallivan's theoretical framework for the secondary adoption and organizational assimilation processes (Gallivan, 2001, p. 60). 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. Gallivan's model includes a feedback loop between what he terms the secondary adoption process, the assimilation stage ("implementation") and the organizational consequences. By combining the two-level improvisational change model with Gallivan's model, it seems obvious that for example ideas for opportunity-based changes at group level depend on the availability of changes at organization level.

5 Conclusion

Our case study of the implementation and use of a virtual workspace application has illustrated some difficulties with implementing open-ended, context-specific IT applications for communication and collaboration in a large organization. We have illustrated the

problems with implementing Lotus QuickPlace in a specific large, distributed organization. However, we think that the difficulties are typical and prevalent in organizations with bureaucratic traditions for centrally managed IT systems with a strong emphasis on IT security and stability.

We would like to draw two overall conclusions from our study that are both relevant for organizations that already have, or are planning to implement open-ended communication and collaboration technologies like virtual workplaces. Firstly, hoping to make context-independent predictions on the use patterns of these technologies is not likely to be useful. This observation is not new, but perhaps more radically observable with virtual workspace technologies. Like e-mail, virtual workspaces have no specific use patterns inscribed. These have to be designed for the individual applications and may further emerge over time as people do their daily work and come to an agreement or common understanding of how to use the system. Eventually, it will over time change the patterns of communication and collaboration in the organization – not as a result of a „one-shot" central change management effort, but as a result of many local changes over time.

Secondly, change management efforts are not useless. We found Orlikowski and Hofman's improvisational model of change useful as a point of departure (Orlikowski & Hofman 1997). We have, however, argued that their change management model, as well as traditional models, tends to ignore that changes happen at two different levels: an *organizational/infrastructure level* where the introduction of the technology is prepared, including establishing the server infrastructure as well as information about the availability of the technology, and a *group level* where the particular application close to the existing work practice takes place. We therefore suggest making this visible by introducing a distinction between an organizational level and a group level to guide the introduction of open, context-specific technologies for communication and collaboration.

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