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Trying to improve communication and collaboration with information technology

An action research project which failed

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Abstract *Discusses the use of information technology to facilitate communication and collaboration. In this action research project a groupware product called Lotus Notes^{TM} was implemented to facilitate communication and collaboration amongst the senior management team. Although there was a real need for change, and the project received strong support from senior management on the basis that it would enable radical changes in coordination within the workgroup, these radical changes did not occur. The authors analyse the reasons for failure, and suggest that the project failed because of institutional forces which inhibited dramatic changes in work habits.*

Introduction

The use of information technology to facilitate communication and collaboration has become an important theme in information systems research and practice. Emerging technologies, such as groupware products and the Internet, offer the potential to dramatically improve the way in which people communicate and collaborate in the organization of the twenty-first century.

Until recently, most of the previous research in the area of groupware has used laboratory experiments in artificial situations. As a general rule, much of this research has suggested that positive effects can be derived from the use of groupware. Work is starting to emerge, however, which suggests that there may be significant counter forces which exist to maintain the status quo in organizations. Many IS researchers have pointed out that the broader social and organizational context within which information technology is

implemented has a profound influence on the way in which IT is used (e.g. Bussen and Myers, 1997; DeSanctis, 1993; Myers, 1994; Walsham, 1993, 1995).

The action research project discussed in this paper was motivated by the desire to understand more fully the relationship between the introduction of groupware and changes in work habits and the organizational structure of an organization. The project involved the introduction of a groupware product called Lotus Notes^{TM} to facilitate communication and collaboration among the senior management team of a tertiary educational institution in New Zealand. Although there was a real need for change, and senior management approved the project on the basis that it would enable radical changes in coordination within the workgroup, these radical changes did not occur. Despite the support of senior management and the initial enthusiasm of their personal assistants, the action research project failed in the sense that it did not achieve what both the sponsors and the researchers set out to do. We suggest that the project failed because of institutional forces which inhibited dramatic changes in work habits. Lotus Notes^{TM} is still used in the organization today, but it is used in such a way that it serves to maintain the status quo.

The paper proceeds as follows. The first section discusses the theoretical framework, and explains why structuration theory is a useful "meta-theory" for understanding the way in which groupware may or may not improve patterns of communication and collaboration in organizations. Section two describes the action research method that was used. In the third section the empirical evidence from the research project is discussed. Section four presents an analysis of the project and tries to explain why participants reproduced their current ways of working rather than adopt the radical change in coordination that was hoped. The final section presents the conclusions.

Theoretical framework

Groupware has received a significant amount of attention from the IS research community. Groupware is sometimes referred to as Computer Supported Co-operative Work (CSCW), Collaborative Computing, Group Decision Support Systems (GDSS), Group Support Systems (GSS), Electronic Meeting Systems, Computer-Support Collaborative Work, Computer-Mediated Communications Systems or Group Negotiation Support Systems. Jessup and Valacich (1993) suggest that the differing names for this field have occurred to reflect the different quadrants on the (Ellis *et al.*, 1991) time/space matrix being studied (see Figure 1), as well as different research institutions historically using differing terminology. Although there continues to be considerable debate concerning the meaning of these terms, in this paper we use the term "groupware" in a broad sense. Wallis defines groupware as "technology that communicates and organizes unpredictable information, allowing dynamic groups to interact across time and space" (Wallis, 1996, p. 23).

Reflecting on the major theoretical strands in groupware research, DeSanctis (1993) suggests a dichotomy between individualist and collectivist

	Time	
	Same	**Different**
Same	Electronic Meeting System Computer conferencing Group Decision Support Systems Presentation software PC screen sharing software	Teleconferencing Video Audio
Different	Video Conferencing Synchronous chat systems	Asynchronous Groupware Email Bulletin Boards Internet News groups Workflow software Group authoring software

Place

Source: Ellis *et al*, 1991

Figure 1.
The time/space matrix

assumptions. She believes that researchers' assumptions about organizations, concerning the role of people, management and technology in organizational change, influence the choice of theories which researchers use in their work.

DeSanctis (1993) suggests that individualism has been an underlying assumption of much of the IS research performed historically in the groupware area. If individualist assumptions are held, the organization is viewed as being made up of individuals, which leads researchers to view GSS as a tool for individuals. She says that this underlying assumption characterizes the work done by Nunamaker and his colleagues at Arizona State University.

The research based on individualist assumptions identifies the weaknesses in groups, as opposed to individuals, and in decision-making (e.g. "process losses", "problems in meetings"). This research then proceeds to design technology to "overcome these deficiencies" in groups (DeSanctis, 1993, p. 99). The success of the GSS is measured in terms of effectiveness, efficiency, and satisfaction. The ability of researchers to measure these changes shows that the researchers believe that instantaneous change can occur in the success of a meeting as a result of actions taken to overcome the deficiencies of working in groups, such as parallel communication. The goal of the GSS is to bring "improvements in organisational efficiency" (DeSanctis, 1993, p. 100).

DeSanctis (1993) suggests that, from the collectivist viewpoint, the organization consists of an aggregation of individuals and is a social structure in its own right. "Because institutions are socially constructed, their role in society varies across culture and time periods" (DeSanctis, 1993, p. 101). Therefore, management policies and technologies give meaning and order to these social structures.

GSS are "viewed as products of the social evolution of the organisation and the larger culture of which it is a part" (DeSanctis, 1993, p. 101). Therefore, a given GSS may "mean different things within different organizations, or even within different groups. Furthermore, its roles and purposes may vary over time as the culture evolves" (DeSanctis, 1993, p. 101).

"Whereas individualistic assumptions lead the researcher to be concerned with the efficiency and effectiveness brought about by the GSS, collectivist assumptions lead to an interest in the social meaning of the technology, its symbolism, how cultural practices affect technology development, and how technology, in turn, reinforces cultural norms" (DeSanctis, 1993, p. 101). Therefore, theory relating to groupware would focus on the cultural rules and norms using collectivist assumptions.

DeSanctis' dichotomy between individualism and collectivism is depicted in Figure 2.

DeSanctis (1993) notes that collectivist theories tend to put great emphasis on the social context in which groupware is used. She indicates that theories using collectivist assumptions are a sound way in which to evaluate the impacts of groupware on groups and organizations. "As GSSs move out of controlled laboratory settings into more widespread organisational use, the increasing popularity of collectivist-based theories can be expected" (DeSanctis, 1993, p. 106). Given that this paper uses collectivist assumptions, we are pleased to help confirm DeSanctis' prediction. Examples of collectivist theories currently used in IS research are actor network theory and structuration theory. In this paper we use structuration theory to help understand the way in which groupware may or may not improve patterns of communication and collaboration in organizations.

Structuration theory
Structuration theory arose from the work of British social theorist Anthony Giddens as a means of explaining the "relationship between structure and action in social systems" (Orlikowski and Robey, 1991). It aims to explain how
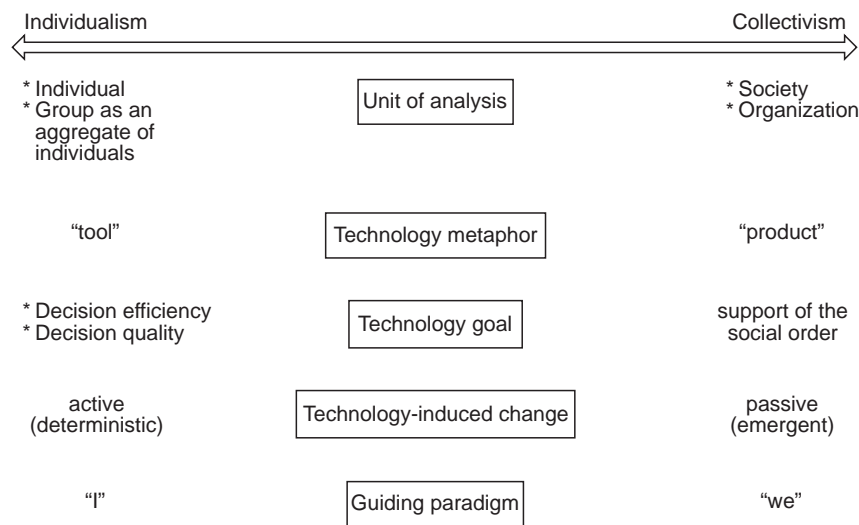

Figure 2.
Opposing perspectives of technology and organizational change

Source: Adapted from DeSanctis, 1993, p. 102

"man actively shapes the world he lives in at the same time as it shapes him" (Giddens, 1984). Structure is central to Giddens' theory and is defined as an "abstract property, which human actors create and interpret though allowing their actions to be constrained by these shared abstractions of social structure" (Orlikowski and Robey, 1991, p. 147). Therefore social systems exhibit "structural properties that are produced and reproduced through interaction of human actors". Giddens posits that social reality exhibits a "duality of structure" in which social reality is constituted by both subjective human actors and by institutional properties" (Orlikowski and Robey, 1991, pp. 145-6).

A number of IS researchers have suggested that structuration theory can be helpful in understanding IS phenomena (e.g. Korpela, 1994; Lyytinen and Ngwenyama, 1992; Orlikowski, 1992; Walsham, 1993). Orlikowski and Robey (1991) view structuration theory as being a "meta-theory" which is able to analyse a system using different units of analysis such as individual, group, organizational and social structures.

Structuration theory is based on three modalities of structuration: interpretative schemes, resources, and norms. Interpretative schemes are "standardised, shared stocks of knowledge that humans draw on to interpret behaviour and events" (Orlikowski and Robey, 1991, p. 148). Resources are "means through which intentions are realised, goals are accomplished, and power is exercised" (Orlikowski and Robey, 1991, p. 148). Norms "are the rules governing sanctioned or appropriate conduct, and they define the legitimacy of interaction within a setting's moral order" (Orlikowski and Robey, 1991, p. 148). The process of structuration occurs as a result of the interaction of the three modalities with human actors and organizations (institutions). This is depicted in Figure 3.
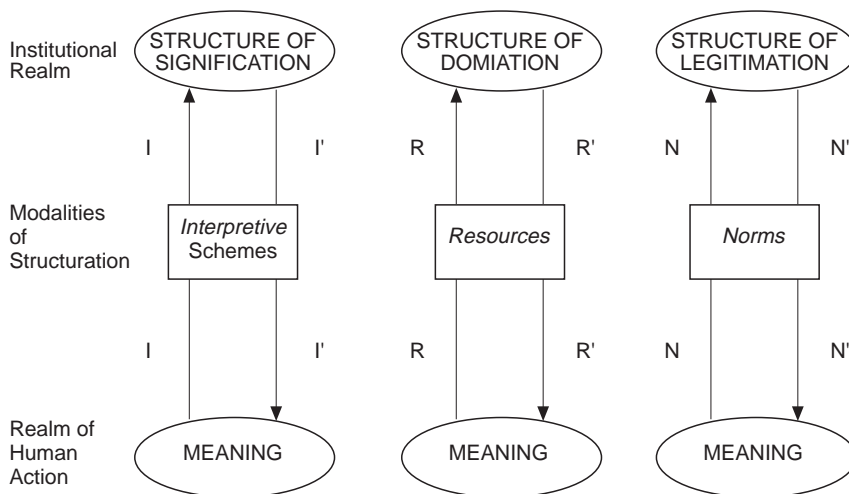

Source: Adapted from Orlikowski and Robey, 1991

Figure 3.
The interaction of human action and institutional properties as mediated by the three modalities of structuration

The interaction between the three modalities occurs simultaneously and is only separated at an analytical level. Through the interplay of these modalities (the process of structuration) human actors reproduce or (less frequently) change existing norms of behaviour.

Orlikowski and Robey (1991, p. 151) "propose a perspective that positions IT centrally within the process of Structuration", as shown in Figure 4.

Orlikowski *et al.* (1995) extend this theory further in which human actors are categorised into those that are users and those that structure the technology for the users in the process of technology-use mediation. The process of structuring technology in use for users is labelled "metastructuring". By metastructuring, they mean the "deliberate, organizationally-sanctioned intervention within the context of use which helps to adapt a new communication technology to that context, modifies the context as appropriate to accommodate use of the technology, and facilitates the ongoing usefulness of the technology over time" (Orlikowski *et al.*, 1995, p. 425).

Lyytinen and Ngwenyama (1992) illustrate the way a groupware product is able to be customised through their diagram of "structuration dynamics of computer supported cooperative work". Figure 5 shows that a groupware product contains rules and resources and the use of the product is an example of structuring. It also shows that from action or inaction, unintended consequences may flow which cannot be predicted.
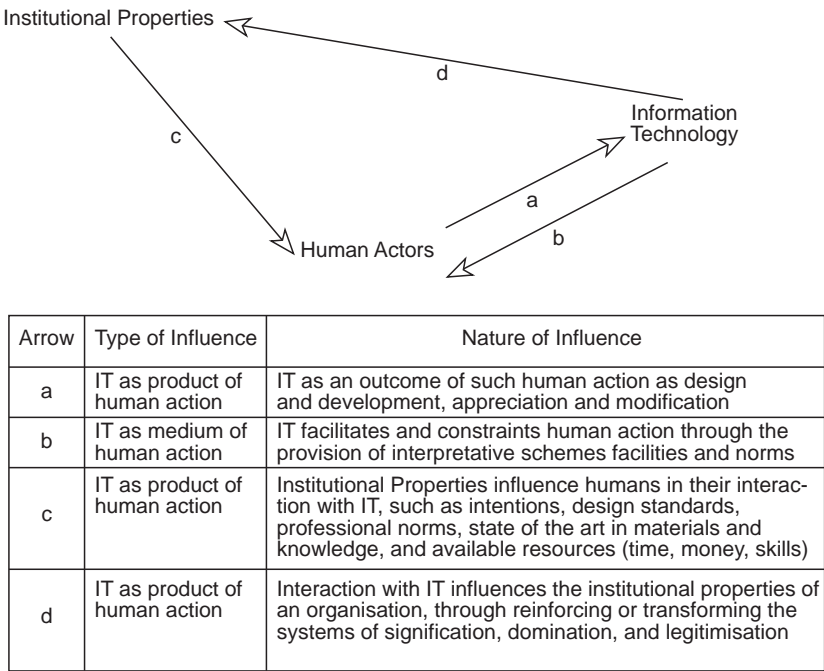

Arrow	Type of Influence	Nature of Influence
a	IT as product of human action	IT as an outcome of such human action as design and development, appreciation and modification
b	IT as medium of human action	IT facilitates and constraints human action through the provision of interpretative schemes facilities and norms
c	IT as product of human action	Institutional Properties influence humans in their interaction with IT, such as intentions, design standards, professional norms, state of the art in materials and knowledge, and available resources (time, money, skills)
d	IT as product of human action	Interaction with IT influences the institutional properties of an organisation, through reinforcing or transforming the systems of signification, domination, and legitimisation

Figure 4.
The structurational theory of information technology

Source: Adapted from Orlikowski and Robey, 1991
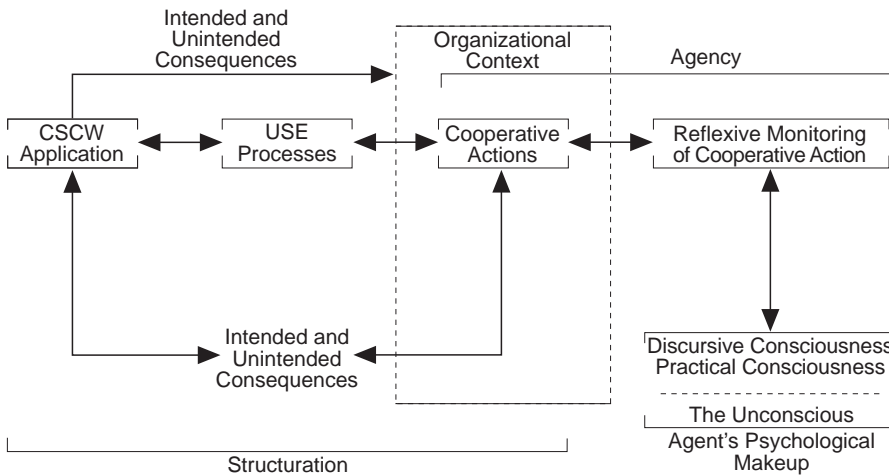
Source: Adapted from Lyytinen and Ngwenyama, 1992

In this paper we use structuration theory to help understand the way in which groupware may or may not improve patterns of communication and collaboration in organizations. We also take up Orlikowski *et al.*'s idea of metastructuring to explore how users contextualise groupware for themselves. We postulate that groupware can be seen as an occasion for structuring knowledgeable human actors who, through their action or inaction with the groupware product, choose to reproduce or (less frequently) change their existing social structure.

Research method
As was stated earlier, one of the main purposes of this research was to explore how IT (and specifically, groupware) can facilitate communication and collaboration in organizations. We decided to use action research as our research method since it enables a researcher to intervene in the organization while at the same time generate knowledge about the process. A number of researchers have suggested action research as a potentially useful method in information systems (Baskerville and Wood-Harper, 1996; Lau, 1997; Myers, 1997).

The underlying epistemology for this research was that of interpretivism. Interpretive research does not predefine dependent and independent variables, but focuses on the complexity of human sense making as the situation emerges (Kaplan and Maxwell, 1994); it attempts to understand phenomena through the meanings that people assign to them (Boland, 1985; Orlikowski and Baroudi, 1991). More extensive discussions of the contribution which interpretive research can make to information systems research can be found elsewhere (Myers, 1997; Walsham, 1993, 1995).

For this action research project we used the action research cycle described by Susman and Evered (1978). The five stages of the cycle are: diagnosing, action planning, action taking, evaluation, and specifying learning. The action research cycle is shown in Figure 6.

In Susman and Evered's (1978) model, the first phase, called diagnosing, involves the identification of primary problems that are to be addressed within the host organization. The second phase, action planning, specifies the organizational actions that should be taken to relieve or address these problems. These planned actions are guided by the theoretical framework of the action researcher. The third phase, called action taking, implements the planned actions. The fourth phase, evaluation, includes analysing whether the planned actions achieved their intended effects. The last phase, specifying learning, specifies what was learned during the action research project. This is when the knowledge gained is applied within the organization and communicated to the scientific community.

The research project was conducted by one of the authors over a four-month period, from September to December 1997, although the initial discussions with management regarding groupware systems began in November 1995. The researcher was and still is an employee of the organization, although not a member of the IS group or of top management (the group which was the subject of this investigation). The "action" taken included installing the groupware software, modifying parts of the groupware as needed, and training of the participants. Data were obtained from unstructured interviews, documents,
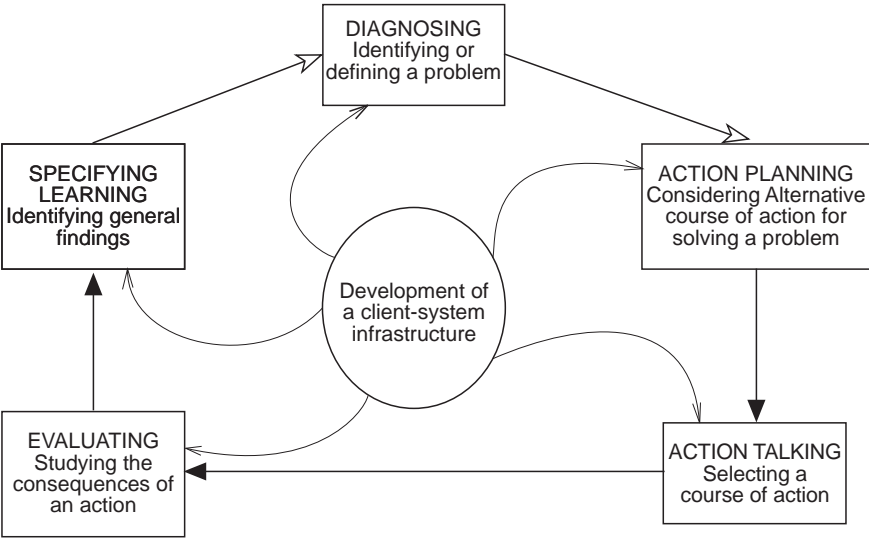

Figure 6.
The action research
model

Source: Adapted from Susman and Evered, 1978

and participant observation and involved documenting the changes in work habits and organizational structure which had occurred as a result of implementing the groupware product.

The organization

The research site was a business school within a New Zealand tertiary educational institution. The school has approximately 350 staff, in a variety of roles, and supports certificate, diploma, and degree courses. The participants in the research project were a pilot group within the client organization made up of seven senior managers and four personal assistants. The participants were selected because they form a workgroup that is required to communicate, coordinate, and collaborate with each other in order to perform functions for the administration of the school.

During the 1980s the school structure was that of a bureaucratic hierarchy and was funded directly by the government. In the early 1990s the school obtained greater autonomy over resources and finances because of a government initiative to introduce bulk funding in 1990. In 1993 the school was restructured as a matrix organization – staff had dual reporting requirements both to their academic groups and program teams. Towards the end of 1996 the school was restructured yet again. This time the organizational structure resembled a hybrid form with multiple reporting channels and intersecting areas of authority and accountability. As Applegate (1994) notes, hybrid organizational forms "demand intense vertical and lateral coordination, negotiation and collaboration to manage day-to-day operations" (Applegate, 1994, p. 59). Hence the need for an IT management system to enable coordination, communications and collaborative activities.

The research project

The research project will now be described according to the five phases of the Susman and Evered (1978) model.

Diagnosing

This stage, which involves identifying or defining a problem in the organization, was performed primarily through unstructured interviews with the participants. These interviews revealed that the personal assistants spent one day per week negotiating meeting times for their respective managers, which the personal assistants perceived as being too time intensive. The time consuming nature of this task was probably due to the complexity of the hybrid organizational structure having created a greater need for consultation with a larger number of staff. The personal assistants and senior managers showed a high level of interest in improving this process. Other processes, such as document management and workflow, were discussed enthusiastically, although they received a lower priority than meeting coordination. In addition to the interviews, documentary evidence was gathered concerning the organizational changes which had occurred within the last five years. This

evidence was analysed and a brief history of the school was written so that the researchers would have a better understanding of the organizational context within which the project was to take place.

Action planning
The second stage of the action research cycle, action planning, involves considering alternative courses of action for solving a problem. The main problem identified was that personal assistants needed to be able to coordinate their manager's diaries and the managers needed to have easy and timely access to these diaries. To do this, the diaries of a large number of people needed to be available at any point in time to coordinate a meeting without taking up one day of the personal assistant's time.

After considering several alternatives, Lotus Notes^{TM} was chosen as the most suitable groupware product since it would enable the participants to communicate from any location at any time and coordinate their diaries, book resources, and manage document repositories. The Lotus Notes^{TM} server had already been set up for teaching purposes and had been running for this purpose during the previous year. The licences had already been purchased and only needed installing. Therefore, a heavy capital investment or high labour costs did not need to be incurred to get the product set up. The researcher then discussed the capability of the solution with the senior managers as well as the personal assistants and received an enthusiastic response, along with questions of when the product could be made available to them.

The organizational implications of the suggested action were to make all the diaries electronic to facilitate the coordination of meetings and consultations and improve the efficiency of the hybrid organizational structure. Participation in the research was voluntary, although no staff member declined to participate in the study. However, if participants chose not to participate, the full potential of the product would not be realised as they would manually have to coordinate all the meeting times with the other participants.

It was agreed that the researcher would be responsible for getting the software installed on the client desktops and training the participants.

Action taking
The third stage, action taking, involves selecting a course of action and implementing the course of action selected. The software was implemented on the desktop over a five-day period. As the software was being implemented, the researcher undertook unstructured interviews with participants, and coordinated the availability of resources for the pilot group (mail databases, resource booking databases, and document repositories etc.) with the information technology department's site technician in the school. The technician was very supportive of the project and had previously installed and upgraded the Lotus Notes^{TM} server, performed maintenance, and provided access to the server for the installations, as well as the required network

resources. After the software was installed, training sessions were held with the participants over a one-week period. All the senior managers attended the training sessions regardless of other commitments, showing their commitment to the project. However, some of the other participants failed to attend these initial training sessions citing other priorities as an excuse.

Evaluating

Evaluation involves studying the consequences of the action taken. Over the next two months the researcher conducted informal interviews with participants and observed how they were using the groupware product. During this period the researcher also continued to help the participants to get to know the groupware product and became involved with general troubleshooting.

Differing concerns were voiced depending on whether the participant belonged to the senior management group or to the personal assistant's group.

Concerns were voiced from the personal assistants about staff having access to see the managers' diaries. The personal assistants did not want others in the school having access to diaries. The researcher set the defaults on the workstations to read only for other staff looking at other people's calendars. Since only the senior management and personal assistants had the product installed, others within the school were not able to access the system. If others within the school had the product implemented in the future the defaults that the researcher set may not be appropriate and the participants could change the defaults to what they thought appropriate. When this option was discussed with the senior managers, they were supportive of having all staff being able to see what they were doing. They were also made aware that they could block out periods when they were unavailable, without the need to disclose why. The senior managers discussed the differing ways that they planned to make effective use of the product to facilitate their work.

Soon after the installation of the groupware product, while the electronic diaries were still new, the senior managers entered quite a few appointments themselves without consulting their personal assistants. The personal assistants complained that the senior managers did not check if there were conflicts and they had to spend a great deal of time sorting out their senior managers' diaries. Once the novelty had worn off, however, the personal assistants were adding most of the entries as before. In this way the system had returned to the previous way of working with only the personal assistants adding entries. A personal assistant commented that "Ideally, it would be good to dedicate one person (the PA/secretary) to managing it so that only one person makes entries, but it could still be available as a view only for others. Initially she (the manager) inputted a lot of appointments, which resulted in clashes, but now the novelty has worn off she does so rarely."

We can see from the above comment that the personal productivity tools that the personal assistants were used to caused them to interpret the groupware product and use it in a similar way. Also, this PA seemed somewhat relieved that she had regained control of her manager's diary.

Although the senior managers supported the implementation of Lotus Notes in principle, the following incident exemplifies how the norms of the senior management started to change only with some difficulty. On one occasion a senior manager asked her personal assistant to remind her of a task that had to be completed in conjunction with another senior manager. The personal assistant created the task in her mail database, and assigned its completion to the senior managers concerned. On noticing that a task had been added to his to-do list without his knowledge, one of the senior managers that had been assigned the task "shot out" of his office to find out how this item had been placed onto his to-do list. Although the personal assistants found this amusing, both the managers and personal assistants soon realised the effectiveness and efficiency of being able to create tasks and assign others to complete them, and at the same time inform interested parties of the status of the task. This method of coordinating the completion of tasks, especially where more than one senior manager was concerned, quickly became the standard.

Despite the support of senior management for the project, the information technology department (for the institution as a whole) was less than enthusiastic about the implementation of Lotus Notes[TM] (even though the product was already installed and being used for teaching). One reason for their lack of enthusiasm may have been the organizational context within which they operate. Usually if a department or school has an information technology need the information technology department decides on a solution and implements it. The researcher's involvement may thus have upset the norms and have been seen by them as encouraging end users to solve their own problems without the involvement of the IT department. The lack of support from the IT department resulted in a few technical difficulties with the groupware product not being resolved in a timely fashion.

Specifying learning
The last phase, specifying learning, specifies what was learnt during the action research project. Senior management approved of staff having full access to their diaries for booking appointments or for accountability which seems to indicate that they wanted to encourage new norms of sharing. Senior management approved of the introduction of the groupware as it aligned with their visions of collaboration. Senior management were trying through the matrix structure to engender a culture of collaboration, and interpreted this product as being able to provide a mechanism for it to occur. They were willing to show leadership and participate in the study.

The personal assistants interpreted the groupware product as being capable of reducing the power they had over their managers' diaries. Before the groupware product was installed, they were the only ones to have access to them. The embedded culture was to protect the managers by not having others in the school looking at what senior management were doing. This also ensured that the personal assistants were consulted regarding every appointment. However, the groupware product could enable anyone in an organization to

look at anyone else's diary. The personal assistants therefore wanted the product customised so that no other member of staff would have access to see their manager's diaries, which did not encourage the new norms of sharing. This also went against the idea of staff being able to set up appointments with senior managers from their workstation at a time that suited them both, without having to consult the manager's personal assistant. The personal assistants were thus influenced by the current norms and did not change their work practices significantly, in effect reinforcing the status quo.

Discussion

This study throws into question much of the previous research work into groupware using laboratory experiments and individualist assumptions. Although positive effects accruing from the use of groupware may occur in a laboratory, we have seen that it is much more difficult to obtain these benefits in social situations. As we said earlier, from the collectivist viewpoint the organization consists of an aggregation of individuals and is a social structure in its own right. Therefore it is important to understand the social environment within which the groupware is used. In this paper we have explored the social and organizational context within which the groupware product was implemented, showing how the personal assistants appropriated the software to suit themselves.

If we now come back to our earlier discussion of structuration theory, we can see that participants' *Interpretative Schemes* led them to interpret the groupware product in a certain way. Although the researcher had portrayed the groupware product as potentially transformative of work, the personal assistants interpreted it as a personal productivity tool. They were mostly interested in how they themselves could save time and improve their own productivity. As a consequence only incremental changes in work habits occurred.

Although senior management supported the project, we have seen that the IT department was less than enthusiastic about it, mostly because the project was not under their control. As a result some *Resources* for the project (i.e. IT staff) were not forthcoming. The lack of support from the IT department meant that some difficulties associated with the installation of Lotus Notes^{TM} were not resolved in a timely fashion.

Broader institutional forces such as the culture and norms of the organization influenced participants' interpretive schemes such that their use and appropriation of the product caused them to reproduce their current ways of working and in effect maintain the status quo. Although senior management was keen to encourage new norms of sharing, the personal assistants interpreted the groupware product as a threat to the power they had over their manager's diaries. In defence of the personal assistants, we would suggest that controlling access to a manager is an essential part of the expectation of what a PA is supposed to do, not just in this organization, but in most business organizations throughout the world. In other words, one of the norms of

"business culture" worldwide is that PAs are expected to be gatekeepers to management. The attempt to introduce the new norms of sharing thus went against this wider aspect of business culture as well as the existing norms within the organization itself.

In relation to Orlikowski *et al.*'s (1995) idea of metastructuring, we have seen how the users in this organization were able to contextualise the groupware for themselves. The personal assistants were able to customise Lotus Notes^{TM} to suit their requirements. In fact it would be fair to say that the personal assistants are quite happy with the way in which Lotus Notes^{TM} is currently being used within the organization. They are pleased that there has been some improvement in the coordination of tasks within the senior management team without any loss of control on their part. Owing to the reproduction of the existing norms within the school, however, there have not been any changes within the organizational structure and the radical changes in cooperation and coordination that were hoped for have not eventuated.

The above observation leads us to add an important qualification to Lyytinen and Ngwenyama's (1992) suggestion that "these (groupware) applications provide a powerful and malleable means to shape work processes by crafting novel resource and enforcing new rules and protocol that can be drawn upon in social interactions" (Lyytinen and Ngwenyama, 1992, p. 27). We agree that groupware applications have the potential to support radical changes in work processes, however, as we have seen here, if the potential of these applications is not acted upon by knowledgeable actors, changes in the signification schemes and ways of working will not occur.

Our research also draws attention to the unintended consequences of human action (or inaction). By agreeing to customise the software according to the personal assistants' wishes during the implementation of the product, we as action researchers inadvertently ensured that the organization never had a chance to experience the "benefits" of sharing. Since Lotus Notes^{TM} is now being used in this organization, potentially it will be much harder in future to use this or any other groupware product as a mechanism to dramatically improve communications and collaborative activities.

Conclusion

Emerging technologies, such as groupware products and the Internet, offer the potential to dramatically improve the way in which people communicate and collaborate in the organization of the twenty-first century. The use of information technology to facilitate communication and collaboration has become an important theme in information systems research and practice. This paper has reported on an action research project in which a groupware product called Lotus Notes^{TM} was implemented amongst the senior management team of a tertiary educational institution in New Zealand.

Contrary to much previous research which has suggested that positive effects can be derived from the use of groupware, in this project we have seen that dramatic improvements in communications and collaborative activities

proved elusive. Although there was a real need for change, and senior management approved the project on the basis that it would enable radical changes in coordination within the workgroup, the hoped for radical changes did not occur. This study throws into question much of the previous research work into groupware using laboratory experiments and individualist assumptions. Although positive effects accruing from the use of groupware may occur in a laboratory, we have seen that it is important to understand the social environment within which the groupware is used.

There are two important implications of this work. The first implication relates to the use of action research as a research method. Action research by definition involves some form of collaboration between the researcher(s) and practitioners. One important objective of action research is to generate new knowledge which is useful for both research and practice. We have shown that, while an action research project may not be successful, in the sense of achieving what both the sponsors and the researchers set out to do, it can still be useful for research purposes. We can learn equally well from failure as from success. Even the client organization can learn from failure, since it is the same institutional environment which constrains both the researcher and practitioners. In our case the participants in the project welcomed the research results as providing important insights into the culture and norms of the existing organization.

The second implication relates to the research results themselves. This project has shown that it is important not to underestimate the power of the counter forces which exist to maintain the status quo. It is one thing to install a groupware product, but quite another to transform existing norms and ways of working. The counter forces can sometimes prevail despite the wishes of senior management (who in this case wanted to use IT to challenge traditional organizational norms and ways of working). The groupware product "worked" and ended up being used by all of the participants, but it ended up being used in such a way that the existing norms of communication and collaboration were reinforced. Changing and embedding a new culture within an organization is perhaps the new challenge of the twenty-first century.

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