Lotus Notes® and Collaboration: *Le plus ça change ...

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Abstract

Work in organizations is becoming increasingly focused on collaborative work in groups. Groupware is widely touted as the information technology that can support this new mode of work by fostering collaboration. In a study of Lotus Notes®, a popular groupware product, implemented throughout the professional staff of a large American insurance company, we found the impact of groupware to be somewhat different from what many might have expected. While almost everyone was quite pleased with the Notes® implementation and its perceived impact, there was no evidence of a change in the degree of collaboration among organization members. Two key themes are explored as possible explanations for this result: fit of the technology to the organization, and limited training in how best to use this new technology.

Introduction

It is widely believed that work in organizations is increasingly becoming centered on collaborative work in groups. Those groups may meet face-to-face in "real time" (what we commonly call a meeting), or they may be dispersed in space, time or both. Whatever the nature of the group, work in groups imposes a new demand for coordination and communication among group members. While traditional computer-based systems offered little support for this needed coordination, recent software developments have attempted to address this need. Groupware has been touted as an exciting new information technology that will provide the higher levels of coordination and cooperation needed to support individuals working together in organizations. Indeed, it has been suggested that groupware will lead to increased collaboration among individuals in organizations.

The term groupware covers a wide range of technologies (Johansen, 1988 [12]). Dennis, Nunamaker and Vogel (1990) [5] represent one line of thought which focuses on electronic meeting systems (EMS) supporting same time-same place work in groups. Other authors discussing groupware have been concerned with systems to support other types of group activities, including joint authoring, common calendar maintenance, and electronic conferencing (Holtham, 1994 [10]). These activities together with the computer-based systems that support them are often referred to as computer-supported cooperative work (CSCW--Kraemer & King, 1988 [15]).

Though much has been written about the potential for these new groupware technologies to improve organizational functioning, there has so far been relatively little evaluation of the actual impact of these technologies, especially in real organizational settings. This paper focuses on the impact of an organization-wide implementation of one particular group support technology, Lotus Notes®, on process and outcome variables in that organization.

Wide-scale implementation of group support technologies in an organization is often touted as an appropriate mechanism for promoting beneficial change within that organization. After reviewing some previous studies which have attempted to evaluate similar technology introductions, we describe the
product, its introduction into the target organization, and our assessment of its impact on collaboration and work outcomes within the organization. Consistent with the findings of others who have begun to study these technologies (e.g., Orlikowski, 1992 [23]), the data seem to indicate that the impact of groupware introduction may not be as dramatic as some of its proponents would suggest.

Prior research on groupware impact

Much of the groupware impact research has been conducted in laboratory settings, has focused on technologies to support face-to-face meetings, and has been concerned with the impact of design variables (e.g., anonymity of individual contributions) on group process (e.g., equality of participation by group members) and outcomes (e.g., group effectiveness, satisfaction with the process). Our concern is somewhat different. First, we are interested in the impact of groupware on group processes in real organizations, which may not be the same as the impact in a laboratory. And, second, we are concerned with collaborative behavior generally, not just behavior in face-to-face meetings.

Researchers at the University of Arizona have been engaged in a long-term project to develop and assess group support technologies, especially electronic meeting systems. Much of their empirical research has been based in the laboratory, and has focused on the changes to group processes resulting from the use of these systems. This laboratory research examined such issues as the impact of anonymity and group size on group member participation and group “efficiency,” the impact of task type on interaction style and group member satisfaction, etc. These laboratory results, summarized in Nunamaker et al. (1991) [22], suggest that the impacts of group support technologies can vary significantly across situations.

The “Arizona” studies generally focus on what has been termed “high structure” meeting environments. That is, the EMS technology employed in those studies imposes a high degree of structuring or guidance on the meeting and the meeting participants. In addition to providing the necessary communication channels, the system (together with the meeting facilitator) provides an agenda for the group’s process. Other group support technologies, including some other EMS, provide the communication channel to support collaboration without imposing a high degree of structure on the interaction. McLeod & Liker (1992) [18] report on a laboratory study comparing groups using a “low structure” EMS to groups with no system support. They found no difference in participation levels or satisfaction across groups, significantly lower task oriented behavior in the EMS supported groups, and mixed results on task performance.

Hiltz and Turoff (1985, 1993) [9, 8] found that the social connectivity of users who adopt a computer-mediated communication system increases about tenfold. In conjunction with this, they found that there is a strong tendency toward more equal participation, and more opinions tend to be asked for and offered. In contrast. Weisband et al. (1995) [35] found that people tend to maintain their relative status in spite of the medium through which they are communicating. Hence the evidence about the impact of computer mediated communication systems on collaboration appears to be equivocal.

There have been a few studies which examined the impact of Lotus Notes® in organizational settings. Notes® is a “low structure” groupware product that has been hailed as setting the standard for groupware (Holtham, 1994; Pickering, 1994) [10, 24]. It is touted as providing organizations with a technology to support and encourage collaboration (Kiely, 1993) [14]. The product is “a combination document creator and indexer, database generator and manager, and messaging platform. Notes® lets users transform normally unstructured textual documents into databases, incorporating fields that can be searched and indexed, without the usual constraints of field and record length associated with normal databases” (Schlack, 1991, p. 24) [26]. Its essential components are electronic mail and document databases. Document databases are advanced bulletin boards with features such as views, filters, and search capabilities.

Besides these database features and the fact that it is easy to use, an attraction of Notes® is the integration of these document databases with e-mail: e-mail messages can be forwarded onto the document databases and vice versa. This provides an infrastructure that supports a fluid interaction between individuals and within groups. To organize entries in a database, Notes® supports a hierarchical categorization scheme based on topics. A discussion topic can also have subtopics, resulting in headings and subheadings in the database. Underneath each heading, the titles of the various messages are listed together with the author’s name. Another structuring mechanism that Notes® offers is the classification of entries into a main topic and a response. A response is a document that is “attached” to the entry to which it refers. These structures help people distinguish the important from the unimportant and offer them ways to process
information without having to read messages in their entirety.

Every message in Lotus Notes\textsuperscript{*} has a time stamp and reveals the identity of the author. Depending on the way the read/write privileges are set up, documents on a database may or may not be edited by people other than their author. This means that a conversation among a group of people can be held within one document. People can, for instance, choose a color or font that differentiates them from the others, and/or they can initial their comments.

Orlikowski (1992) \cite{23} reports on the adoption of Notes\textsuperscript{*} in a large, geographically dispersed professional services firm. Her findings indicate that the organization's culture and the users' understanding of the technology can have a marked impact on the degree to which a technology like Notes\textsuperscript{*} can impact collaboration among group members. She suggests that the lack of an appropriate framework for understanding how the Notes\textsuperscript{*} technology differs from other, more familiar technologies (e.g., spreadsheets or e-mail) leads to an adoption which fails to take advantage of the true potential of the new technology. Further, she notes that the basically competitive nature of the organization's culture limited the extent of interest in a technology to support collaboration. Kiely (1993) \cite{14}, in summarizing the observations from several field studies of Notes\textsuperscript{*}, including Orlikowski's, concludes that Notes\textsuperscript{*} is able to enhance collaboration in organizations which have an inherently collaborative culture, but that such organizations are probably relatively rare at present. None of the reported studies of Notes\textsuperscript{*} implementation have focused on other aspects of implementation outcomes.

The study

This study represents an attempt to increase our understanding of the impact that Notes\textsuperscript{*} (or another similar groupware product) has on organizations that adopt it. Our concern is both with the nature and extent of collaboration as well as such outcome variables as efficiency, effectiveness and satisfaction. We investigated the roll out of Notes\textsuperscript{*} at a large American insurance company. Over a ten month period we collected usage statistics, conducted a series of interviews and undertook two surveys of users. This design enabled us to develop an understanding of the effect that Lotus Notes\textsuperscript{*} had on the organization and how that effect changed over time.

The company is a major insurance company headquartered in the midwestern United States with major operations from coast to coast. In 1993, it had premiums in force of $1.8 billion and 5,800 employees. The company adopted Lotus Notes\textsuperscript{*} to allow geographically dispersed members of the organization to participate in a corporate reengineering effort. Historically, the organization consisted of highly autonomous units which were distributed throughout the United States. In 1992, the company instituted several initiatives aimed at centralizing control over its key activities. It built a campus to house the divisions headquartered in its home state at a single location. It undertook a set of Process Management Initiatives (PMI) intended to standardize the company's key activities across its eleven regional divisions. These processes included claim service, premium quoting, premium billing, customer service, customer retention, rate revision, and distribution. One of the division presidents took responsibility for each of these process initiatives. This responsibility included the formulation of a vision statement, a measurement system and plans for improving the process.

Lotus Notes\textsuperscript{*} was regarded as a key component in supporting this reengineering effort as it allowed people who were geographically dispersed to participate in discussions about change. In addition, Notes\textsuperscript{*} provided those not directly linked to the initiatives with a mechanism for staying informed. People could be peripherally involved in the discussions around process standardization without being part of the decision making group. This was intended to ensure visibility of the PMIs, and it gave people with innovative ideas a chance to be heard by those in charge of redesigning the processes. Using the Lotus Notes\textsuperscript{*} databases as discussion forums opened up the decision making process to everyone.

At the outset of our study, 337 people in the organization had Lotus Notes\textsuperscript{*} on their desktops, and about 29 gigabytes of disk space was used to store their mail folders and 300 databases. By the time of our first survey, over 1,200 had the technology. By the time of our final survey, about 2,200 people had Notes\textsuperscript{*} and close to 60 gigabytes of storage was used for their mail folders and more than 2,000 databases.

Research design

Interviews. Semi-structured interviews were conducted at the outset of our project. We interviewed seventeen senior managers and thirty other employees at all levels of the organization to gain an understanding of their objectives for the Notes\textsuperscript{*} implementation and to understand their perspectives and expectations vis-à-vis the technology. Both face-to-face and telephone interviews were conducted. Each
lasted from 30 to 45 minutes and was recorded and transcribed for subsequent analysis. We did not ask interviewees about collaboration specifically, but rather about their use of and opinions about the technology and the difference it made to their work and to the organization.

Surveys. The interviews provided a glimpse at the way Notes was being received by the organization, but interviews with fewer than 50 employees could not provide an adequate representation of the way Notes was affecting the broad segments of the organization which had adopted this new technology. In order to capture this broader picture, we surveyed a much larger sample of employees three months after we conducted the interviews, and again six months later. The first survey was administered to a random selection of 450 employees. Of these 20 did not have access to Notes at the time and another 5 had been included in the pretest, resulting in a true sample of 425. A total of 290 surveys were returned, for a response rate of 68%.

The second survey, which contained the same questions as the first, was administered six months later to the same employees. This time 245 completed the survey for a response rate of 54%. One-hundred and eighty-six employees completed both surveys resulting in a final response rate of 41%. The paired responses of this group were used for all subsequent analyses.

T-tests were run to determine if the demographics of the people who only responded to the first survey (n=98) differed substantially from those that responded to both surveys (n=186). We found no statistically significant differences in tenure with the company, tenure in the job, and age. These results satisfied our concern about the possibility of a systematic bias in the final sample.

The group of respondents that answered both questionnaires had varying levels of experience with Notes. At the time of the first survey, 45.6% had had access to Notes for 3 months or less, another 16.3% for between 3 and 5 months, and the remainder for between 5 months and 2 1/2 years. On average, they used Notes for 1.6 hours per day at the time of the first survey and 1.9 hours per day at the time of the second survey. They ranged in age from 22 to 57, had been with the company from less than a year to more than 22, with a mean of 7 years. They had, on average, been in their current jobs for 3 years.

In order to develop an understanding of how Notes affected collaboration, we asked respondents to complete scales on degree of collaboration and individual and organizational impact. Appendix I shows the wording of the items which make up these scales.

Degree of collaboration. There are several ways of determining the level of collaboration in a group. Social psychologists typically locate individuals in their roles with respect to one another and the group. They have identified various roles such as isolate, group member, liaison and boundary spanner. Other measures are used to describe the degree of collaboration within social relations, and include degree of centrality or integrativeness, information exchange, expertise exchange, friendship and status. All of these dimensions can be combined to determine the degree and nature of collaboration within an organization (Van de Ven et al, 1976) [32]. Thompson (1967) [29] focuses on the nature of the relationship among individuals and groups, defining pooled, sequential and reciprocal interdependence as reflecting increasing levels of need for communication and collaboration. Following Moch, Feather and Fitzgibbons (1983) [20]. we chose to use a scale that taps into the myriad of potential interdependencies and collaborations found in organizations. In a carefully constructed study, Moch, Feather and Fitzgibbons developed a scale to measure degree of interdependence within a work group, between the work group and other groups in the division, and between the work group and other divisions in the organization. The scales ask for assessments of need for assistance, need for information or advice, and interdependence of work. Moch, Feather and Fitzgibbons found that this scale was highly correlated with more traditional measures such as network diagrams, providing evidence for its validity as a measure of work flow interdependence. Their scale was used to measure the degree of collaboration within the organization we studied. We divided it into three subscales: departmental, divisional and corporate collaboration.

Impact. A fundamental issue facing all MIS researchers is the selection of a dependent construct to measure system success (Keen, 1981; Srinivasan, 1985; DeLone & McLean, 1992) [13, 27, 4]. The ultimate aim of most systems is to improve organizational performance. However, because of the many confounding factors, alternate explanations, and time lags associated with the measurement of performance, researchers frequently develop surrogate measures. User information satisfaction (UIS) and system use are two of the most common (Keen, 1981) [13], even though these measures are not ideal and their appropriateness is often dependent on the situation under investigation (Ives, Olson and Baroudi 1983) [11]. For example, high use may be an indication of a successful system, of a system that is very easy to use, or of compliance with a mandate for use from
management (see Lucas, Ginzberg & Schultz, 1990, Chapter 5) [17]. High use of a system may also result when the system is the only source for necessary information or provides a channel of communication not otherwise available.

Given the difficulty of interpreting data on use and/or satisfaction, we chose, following DeLone and McLean (1992) [4], to measure individual and organizational impact.

**Individual Impact.** DeLone and McLean (1992) [4] define individual impact as "an indication that an information system has given the user a better understanding of the decision context, has improved his or her decision-making productivity, has produced a change in user activity, or has changed the decision maker's perception of the importance or usefulness of the information system" (p. 69). Davis (1989) [3] followed a careful process to develop a reliable and valid scale to measure perceived usefulness. In two separate studies, the scale attained exceptionally high reliability scores (Cronbach's alphas were .97 and .98) and high scores on measures of convergent and discriminant validity. Davis' final questions were incorporated into our study questionnaire to measure perceived usefulness.

**Organizational Impact.** There is general agreement that organizational performance is multidimensional (Venkatraman & Ramamujan, 1987) [33], although there is some disagreement about what the dimensions actually are. Barnard (1938) [1] divides performance into efficiency and effectiveness. In partial agreement, Lawrence and Dyer (1983) [16] believe performance hinges on the appropriate balance of efficiency and innovation. Steers (1975) [78] believes that organizational effectiveness is best understood in terms of productivity, flexibility, and the absence of intranorganizational strain.

In simple terms, performance can be divided into two components: doing things right (efficiency or production) and doing the right things (effectiveness, innovation, flexibility). Efficiency and effectiveness have often been used as surrogates for performance in management research. Recent examples can be found in the strategy (Reed 1991) [25], organizational behavior (Williams & Anderson, 1991) [34], and MIS (Marciniak 1992) [21] literatures. Vandenbosch (1993) [31] developed scales to measure perceptions of efficiency and effectiveness related to executive support systems. Those scales proved to be both reliable and valid in that context, so were modified and used to assess performance in the survey.

**Results**

**Interviews.** The initial interviews clearly indicated that no one in the organization had spent time thinking about how Notes* would change the organization. One division president complained,

*No one has said, 'Here is the vision. Here is the ultimate end objective that we are trying to create.'*

In addition, there was concern on the part of some that the organization was not making full use of the technology.

*It is nothing but a big expense."

*When one reads about Notes* in other organizations, one gets the perception that we are relatively underwhelming in our use of it."

*I know cheaper ways to make people feel good."

*I think that the company has a long way to go in terms of understanding the power of these tools and how to use them. I think a lot of people are still kind of looking at Lotus Notes* as fancy e-mail. And it can be so much more than that, and we are just not doing it."

Nevertheless, most people we interviewed were very supportive of the technology and believed it would improve decision making in the organization.

*Better decisions. Faster decisions. And so all that stuff about making better decisions faster, I think it is really all true. So we got a lot more input, and I believe that leads to better decisions."

*It is an efficient way of exchanging information. And updating each other on what is going on. And communicating.*
Many people also talked about the potential that Notes had to improve collaboration and consultative decision making. I suspect it has probably made me a little more collaborative, if you will, than I have been in the past. Because again, it is just so easy to speak with somebody.

And I think that standardization will help a lot of people work together better.

We have spent four or five years fighting to impose consultative decision making, so there will be more. I guarantee there is more all the time. And Notes is not the reason for it, but it may facilitate it.

The benefit of Notes is that it supports our consultative management style. It is a much simpler and more direct way to handle things.

At the same time, some people felt that the benefits were not substantive. One executive was particularly eloquent on this matter.

Communication will be more effective. But it can make us more efficient in bad communication. When we introduced PROFS, we ended up underestimating the amount of hardware we needed to support it. Because communication went up dramatically. But we did not communicate any better. And that is my theory around this. We are going to make a huge investment in this thing and we are not going to communicate any better. We are just going to communicate more efficiently.

With this wide range of opinions, we turned to the survey to determine how people’s views about Notes changed over time.

Surveys. Two analyses were undertaken to investigate collaboration using the survey data. In the first, repeated measures MANOVAs were employed to determine if there were any changes in perceptions between the time of the first and second surveys. In the second, correlations among the constructs were calculated to determine if collaboration was related to perceptions of impact vis-à-vis Notes.

The differences between perceptions at the time of the first survey and the time of the second survey were calculated using MANOVA. A repeated measures design with multiple dependent variables was specified with time as the single factor for each of the six constructs of interest. Table 1 shows the results of these analyses. The means and standard deviations of the dependent variables comprising each construct are also shown. Each of these constructs was measured on a 5-point scale (1 = low, 5 = high).

These results indicate that there were no significant changes in the amount of departmental, divisional, or corporate collaboration between the times of the two surveys. Perceived usefulness, efficiency, and effectiveness all had at least one variable that was significantly different between the two surveys. Biases associated with a potential Hawthorne effect were ruled out because of the differing outcomes. Biases associated with recall were not considered likely either because of the length of time between the two surveys.

To evaluate the changes in perceived usefulness, efficiency and effectiveness more precisely, a post hoc Bonferroni procedure was used to control the Type I error rate. Perceived usefulness had six dependent variables in the analysis, so an overall significance level of p<0.05 was maintained with individual significance of p<0.008. All of the individual variables had changed significantly at this level between the first and second surveys. Perceived efficiency and perceived effectiveness both had five dependent variables. Hence the significance level that was required to maintain an overall significance level of p<0.05 was p<0.01. One variable in the efficiency construct (speeds decisions) and two in the effectiveness construct (organizational effectiveness and innovation) failed this post hoc test.

To evaluate the relationship between collaboration and impact, zero-order Pearson correlation coefficients were calculated. Because of the high Cronbach’s alphas that were achieved for each construct, the means of the items comprising each were calculated and used in the correlation analyses. Tables 2, 3 and 4 show the Cronbach’s alphas and the correlation matrices for the first and second surveys respectively.

These results indicate a strong relationship between level of collaboration and perceptions of impact at both individual and organizational levels. The insignificant results for departmental impacts at the time of the first survey may be explained by a lack of understanding of the potential of the tool at the local level in the early phase of its adoption.
### Table 1

Changes in Perceptions of Key Constructs

<table>
<thead>
<tr>
<th>Construct</th>
<th>Time 1 Mean</th>
<th>Time 1 SD</th>
<th>Time 2 Mean</th>
<th>Time 2 SD</th>
<th>Hotelling's $T^2$ (1.181)</th>
<th>Significance of $F$</th>
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</thead>
<tbody>
<tr>
<td>Departmental collaboration</td>
<td>3.57</td>
<td>.81</td>
<td>3.56</td>
<td>.82</td>
<td>.01864</td>
<td>.779</td>
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<tr>
<td>Divisional collaboration</td>
<td>3.26</td>
<td>.81</td>
<td>3.29</td>
<td>.83</td>
<td>.02757</td>
<td>.589</td>
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<tr>
<td>Corporate collaboration</td>
<td>2.91</td>
<td>.95</td>
<td>2.86</td>
<td>.97</td>
<td>.04664</td>
<td>.267</td>
</tr>
<tr>
<td>Perceived usefulness</td>
<td>3.86</td>
<td>1.01</td>
<td>4.16</td>
<td>.97</td>
<td>.12553</td>
<td>.003</td>
</tr>
<tr>
<td>Perceived efficiency</td>
<td>3.76</td>
<td>.92</td>
<td>4.02</td>
<td>.80</td>
<td>.17528</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Perceived effectiveness</td>
<td>3.48</td>
<td>.88</td>
<td>3.68</td>
<td>.78</td>
<td>1.0400</td>
<td>.003</td>
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</table>

### Table 2

Cronbach's Alphas for Key Constructs

<table>
<thead>
<tr>
<th>Construct</th>
<th>Cronbach's Alpha</th>
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<tbody>
<tr>
<td>Departmental collaboration</td>
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<tr>
<td>Divisional collaboration</td>
<td>.8372</td>
</tr>
<tr>
<td>Corporate collaboration</td>
<td>.8368</td>
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<tr>
<td>Perceived usefulness</td>
<td>.8846</td>
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<tr>
<td>Perceived efficiency</td>
<td>.8813</td>
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<tr>
<td>Perceived effectiveness</td>
<td>.8970</td>
</tr>
</tbody>
</table>

### Table 3

Correlations - Survey 1

<table>
<thead>
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<th>Collaboration</th>
<th>Perceived Usefulness</th>
<th>Perceived Efficiency</th>
<th>Perceived Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Departmental</td>
<td>.2444</td>
<td>.1277*</td>
<td>.1092*</td>
</tr>
<tr>
<td>Divisional</td>
<td>.3001</td>
<td>.2022</td>
<td>.2702</td>
</tr>
<tr>
<td>Corporate</td>
<td>.2850</td>
<td>.1589</td>
<td>.1802</td>
</tr>
</tbody>
</table>

* Insignificant correlation at $p<.05$; all other correlations significant at $p<.05$.

### Table 4

Correlations - Survey 2

<table>
<thead>
<tr>
<th>Collaboration</th>
<th>Perceived Usefulness</th>
<th>Perceived Efficiency</th>
<th>Perceived Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
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<td>.1510</td>
<td>.1835</td>
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<tr>
<td>Divisional</td>
<td>.2025</td>
<td>.2299</td>
<td>.2517</td>
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<tr>
<td>Corporate</td>
<td>.3545</td>
<td>.2993</td>
<td>.3511</td>
</tr>
</tbody>
</table>

Note: All correlations significant at $p<.05$. 

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Discussion & conclusions

In the organization studied, the introduction of Notes\textsuperscript{*} resulted in general satisfaction, but no increase in collaboration. Our initial interviews indicated a general belief that Notes\textsuperscript{*} would improve communications efficiency within the organization. The two surveys taken 3 and 9 months later showed perceived usefulness of the software product itself as well as perceived organizational efficiency and effectiveness to have increased. Perceived collaboration, however, at all levels - department, division, and corporation - remained unchanged over the period of this study. There was, nonetheless, a significant correlation between an individual's perception of collaboration and his/her perception of usefulness, efficiency and effectiveness. That is, those individuals who indicated that they collaborated most with others gave Notes\textsuperscript{*} the highest marks.

What do these results tell us about the implementation of groupware? The view of groupware forwarded in the popular and trade press is that it can be implemented in an organization and will lead to an increased level of collaboration among the people in that organization. The results of this study suggest that the process is not so easy and straightforward. While general satisfaction with the outcome was expressed, overall, we cannot detect any change in the level of collaboration within this organization following the implementation of Notes\textsuperscript{*}. There was a range in levels of collaboration across the individuals in the organization prior to the introduction of Notes\textsuperscript{*}, and that range was maintained following its introduction. Those who collaborated most before (the "collaborators") continued to do so. Those who had not collaborated before (the "loners") continued not to. Further, the "collaborators," those whose existing style of working best fit the model implicit in Notes\textsuperscript{*}, indicated the greatest degree of satisfaction with Notes\textsuperscript{*} and its impact. In considering these results, we should keep in mind that the introduction of Notes\textsuperscript{*} in this organization was not accompanied by any rigorous training program which would lead organization members to adopt a new mode of working. The technology was given to everyone, a minimal training session was provided, and it was assumed that people would learn to use the new technology in an appropriate manner to support their working environment and work relationships. This is in direct contrast to recommendations by Orlikowski (1992) [23] that such training is critical.

While we must be careful in generalizing from a single case study in one organization, the results of this study are in fact quite consistent with previous studies of system implementation generally and Notes\textsuperscript{*} implementation in particular. Bjorn-Andersen, Eason & Robey (1986) [2] concluded after conducting a multi-country study of multiple computer-based systems, that these systems more often reinforce existing structures and practices than introduce new ones. The notion of information technology as the spearhead for change in organizations is, in most cases, just not applicable. Orlikowski (1992) [23], too, in her study of Notes\textsuperscript{*} implementation, found that it did not necessarily lead to the changes in work practices and increases in collaboration that those who had introduced it had been hoping for. She points out in her analysis the need for both an appropriate framework for understanding the technology, and a fit between the technology's underlying premise (e.g., collaboration) and the organization's structure, culture and policies. There is the possibility that insufficient time had elapsed during the time of our study for changes in collaboration to have taken effect. However, Tyre and Orlikowski (1994) [30] found that system usage patterns congeal in about three to four months, making this possibility less plausible.

Groupware will, no doubt, develop to be an important technology. However, it will not mysteriously transform organizations from collections of highly competitive loners to well integrated, cooperative groups of collaborators. Without careful planning for its introduction and the changes that this will entail, the impact of groupware will likely be quite limited. This message is not a new one, and has long been a part of the prescription for successful information system implementation (Ginzberg, 1981) [6]. Nonetheless, the evidence both from this study and in the popular press suggests that the message bears repeating. Successful groupware implementation will require both a careful assessment of the fit of the technology to the organization and a well designed training program to introduce this new technology and its potential to the organization members.

The organizational assessment must address the question of fit between the technology and the key features of the organization - structure, culture, policies and reward system. Where potential conflict is found, a decision must be made. Can the technology provide sufficient benefit if it is implemented in the organization as it stands? Or will it be necessary to change the technology, the organization or both in order for implementation to be a success? Recent work on the implementation of advanced manufacturing
systems (Mason & Nelson, 1993) reiterates the importance of changing the culture first in order to obtain maximum benefit from these sophisticated systems.

Finally, we turn to training. Groupware is meant to support organizational processes which are likely different from those which have been in place in the organizations adopting it. The implicit model behind groupware is different from the model behind other software tools that organization members are familiar with. Instructing new groupware users in the mechanics of its operations will not be adequate. They will learn to operate the new technology, but they will fit that operation into their own framework for understanding technologies. That is, they will view it, for example, as a more sophisticated e-mail system, and will use it as such. Without training aimed specifically to develop a new framework for understanding the technology and its potential, it is unlikely that the full benefit can ever be reached.

Groupware offers the potential to transform organizational functioning. The accumulating evidence from this study and others indicates that achieving that transformation will require significant effort. The guidelines presented here are very consistent with prior research on IS implementation, and should provide a direction for those organizations seeking to utilize this technology most effectively.

References


APPENDIX 1
SURVEY QUESTIONS

Collaboration

In doing your work, to what degree do you need assistance from:
- Other people in your department?
- People in other units in your division?
- People in other divisions or corporate?

In doing your work, to what degree do you need information or advice from:
- ... department? ...division? ... corporate?

To what degree does your work depend on work done by:
- ... department? ...division? ... corporate?

To what degree do each of the following need your assistance in doing their work?
- ... department? ...division? ... corporate?

To what degree do each of the following need information or advice from you to do their work?
- ... department? ...division? ... corporate?

To what degree do each of the following depend on you to do their work?
- ... department? ...division? ... corporate?

Perceived Usefulness

Notes
- enables me to accomplish tasks more quickly.
- improves my job performance.
- increases my productivity.
- enhances my effectiveness on the job.
- makes it easier for me to do my job.
- is useful in my job overall.

Perceived Organizational Efficiency

Notes
- saves (company name) time.
- allows more work to get done in the organization.
- enables the organization to react more quickly to changes in the marketplace.
- speeds decision making.
- improves the organization's efficiency.

Perceived Organizational Effectiveness

Notes
- improves the organization's effectiveness.
- helps the organization to respond more appropriately to changes in the marketplace.
- facilitates innovation.
- improves the quality of decisions.
- helps the organization to determine which products and services to market.