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# Consequences of Web-based technology usage

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## Abstract

Web-based technologies are rapidly becoming an integral part of the business fabric, interwoven into most departments and functional areas. However, the consequences of adopting these innovations, such as anticipated versus unanticipated and desirable versus undesirable consequences, warrant further exploration. This paper describes the experience of a contract service business after adopting a Web-based collaborative technology to share information throughout the firm. User perceptions and attitudes towards this technology and its impact on time, control, and organisational change were explored via qualitative interviews. The results suggest that there were a number of consequences relating to these dimensions. We reflect on these consequences and offer suggestions based on the generalisability of the results. Further studies are identified that extend the exploration into the impact of Web-based collaboration.

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## Introduction

The diffusion of Internet-based information systems throughout the workplace is changing the manner in which we work and the way we interact with our colleagues, customers and suppliers. McKenna (1997) contends:

Technology is transforming our existence in profound ways. Almost all technology today is focused on compressing to zero the time it takes to acquire and use information, to learn, to make decisions, to initiate action, to deploy resources, to innovate. When action and response are simultaneous, we are in real time.

In addition, this shift in time-demands and resulting competitive pressures are changing organisational structures:

Increasing competition, information that could be outdated in the next hour and customers demanding immediate responses to product and service requests (customised to their needs) mean a major adjustment in company structure. To meet the challenges effectively, many companies have adopted reorganisation strategies that include downsizing, restructuring, re-engineering, outsourcing, and merging or spinning off companies (O'Reilly, 2001).

McKenna (1997) similarly states:

The transition to real time operation has begun to churn up huge creative chaos inside corporations.

Byrne (2000) suggests:

... the twenty-first century corporation must adapt itself to management via the Web. It must be predicated on constant change, not stability, organised around networks, not rigid hierarchies, built on shifting partnerships and alliances, not self-sufficiency.

O'Reilly (2001) further suggests that Internet-based technologies are creating information overloads where "a major task of practitioners is to help mobilise those frozen by the overload of information". She also suggests that Web-based information systems are causing profound organisational changes:

... the changing face of the labour market has driven more people to look at their skills and qualities – and where those skills can take them. More attention has been focused on the increased need to analyse transferability of skills and mobility in work roles.

While the scope of these changes on work practices, relationships, and culture is enormous, this study explores one small aspect of it. Specifically, we examined the impact of adopting a Web-based collaborative

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technology on a small contract service business. Using qualitative in-depth interviews, this research team explored user perceptions of how this technology influenced the companies' work, paying particular attention to the impact on time, control, and organisational change.

### Lessons learned from the literature

It seems logical to assert that Internet-based information systems have created profound changes throughout organisations. Researchers have begun to document the impact of these changes. One common thread appears to be that applications should be Web-based in their design, and that they support distributed collaboration and decision making.

### Organisational change

#### Organisational change

In most organisations, few people possess all the information required to make optimal decisions. By taking advantage of Web-based information systems, associates can access information from many sources at any time and from any place. O'Reilly (2001) suggests that this has created more team-based decisions and new organisational structures:

This new team-focused environment is not amenable to middle managers who passed down orders and pass up information. When flattened, less rigid, less hierarchical companies do hire managers, they look for individuals who can act as part coach, part consultant and part boss, and demonstrate exceptional leadership. This, in turn, means managers have high expectations for their workers to be flexible and to possess the attitudes and behaviours necessary for working in teams.

Thus, the inference is that Web-based information systems can lead to organisational changes by facilitating organisations that are more organic in structure and can adapt more easily to share information in a timely and co-ordinated fashion.

#### Communication and relationships

Web-based technologies have similarly created performance improvements in organisations by changing roles and patterns of communication. Ciborra and Patriotta (1996) state: "Electronic networks open up new possibilities for reducing barriers to

communication and sharing organisational knowledge". Similarly, Solomon (1998) quotes Arthur Andersen and Co.:

Our competitive advantage is what the organisation knows, not what one person knows any more, especially because our clients are so sophisticated now. This requires technology that facilitates information sharing. Technology offers solutions that can maximise the efficiency of people. Eliminate redundant costs by centralising data.

Townsend *et al.* (1998) further assert that electronic collaboration tools can tap into expert knowledge and resources throughout an organisation "where productivity, flexibility, and collaboration will reach new, unprecedented levels". He suggests that success in increasingly competitive marketplaces will depend on effective communications and knowledge sharing among members.

In terms of changing the way people work and relate to each other, Satzinger *et al.* (1999) found that when study participants had creative ideas available to them supported by a collaborative technology, they produced significantly more creative ideas than those participants that did not have that knowledge available to them. They suggest that this research is consistent with both the social interaction stream of research and the cognitive processing stream of research since "individuals conformed to the type of feedback provided and ideas they generated were similar to the ideas provided to them". This demonstrates the impact of group memory and how its use could actively influence individual or group brainstorming and idea generation. They further suggest that if an organisation were interested in particular problem-solving activities, they would be able to seed the organisational memory to start the process and further use the CSCW (Computer-support collaborative work) technology to allow participants to share their ideas and create greater synergy. Web-based information systems increase the scope of that process by opening up global networks and ideas to people.

Ross-Flanagan (1998) similarly found that: "... when groups used computer-mediated communication in brainstorming tasks, they outperform face-to-face groups in the number of ideas generated and according to some studies, the quality of ideas.

She speculates that seeing ideas on the screen makes them more real to people. In addition, they can reflect on them longer and tend to

reply with longer, more complex and more carefully developed responses.

Several authors explored the related issues of relationships and teams when working with Web-based collaboration tools. Several of the authors (Coutu, 1998; McCune, 1998; Schultz, 1996; Solomon, 1998) emphasised the importance of establishing relationships, usually recommending face to face meetings to establish these relationships as a precursor to effective collaboration. The issue of trust and effective communication and interpersonal skills becomes exceptionally important when working in a collaborative environment, particularly a distributed, Web-based one.

Liff (1998) studied a Web-based groupware technology, and suggested that “groupware (e.g. CSCW) is not just another technology; it is also social. It impacts the way people communicate with each other; impacting the way people work”. Mark and Wulf (1999) studied the impact of using a CSCW technology within a government agency in Germany. They found that the change from physical to electronic exchange of documents reduced the number of meetings and saved time in that regard, but it also reduced the richness of the face-to-face communication process, thereby potentially reducing the quality of communication among associates. Time was also saved in the fact that people now tended to work more independently. While this may represent a process improvement, the researchers found that “occasionally information important for a task was not communicated any more” as it would have been with face-to-face communication, causing long-term negative impacts on the social networks within the organisation. They suggest that organisations that rely heavily on electronic systems such as CSCW should develop planned channels of communication to compensate for the loss in the interpersonal process within the organisation. These researchers appear to suggest that organisations need to find the right balance between electronic networks and personal communication. Again, CSCW type systems are becoming more Web-based, and the impact of these studies may be more far-reaching than previously thought.

### Time

In terms of the impact of Web-based information systems on time, Byrne asserts, “Employees will increasingly feel the pressure to get breakthrough ideas to market first”. He

further contends, “that rapid flow of information will permeate the organisation. Orders will be fulfilled electronically without a single phone call or piece of paper. The ‘virtual financial close’ will put real-time sales and profit figures at every manager’s fingertips via the click of a wireless phone or a spoken command to a computer”. He further contends, “it’s about speed. All this work will be done in an instant”. “The Internet is a tool, and the biggest impact of that tool is speed”, says Andrew S. Grove, chairman of Intel:

The speed of actions, the speed of deliberations, and the speed of information has increased, and it will continue to increase. That means the old, process-oriented corporation must radically revamp. With everything from product cycles to employee turnover on fast-forward, there is simply not enough time for deliberation or bureaucracy’.

While this sounds like a positive impact, the shrinking time demands may cause increased problems in other areas, for example, employee stress.

Byrne also proposes that Web-based information systems will have a profound impact on the organisation and its structure. He states:

... the organisational chart of large-scale enterprise had long been defined as a pyramid of ever-shrinking layers leading to an omnipotent CEO at its apex. The twenty-first century corporation, in contrast, is far more likely to look like a web: a flat, intricately woven form that links partners, employees, external contractors, suppliers, and customers in various collaborations. The players will grow more and more interdependent. Fewer companies will try to master all the disciplines necessary to produce and market their goods but will instead outsource skills – from research and development to manufacturing – to outsiders who can perform those functions with greater efficiency.

Therefore, as Web-based information technologies diffuse throughout organisations, there may be profound impacts on organisational changes, including the general flattening of organisational structures and the need to develop middle management teams that operate effectively within this new environment.

Web-based electronic networks have been shown to have both positive and negative consequences. Anticipated, desirable consequences have included savings in time, improved productivity, and improved decision making via increased access to timely information. Innovation and creativity were

also shown to improve when workers could share ideas and knowledge. On the other hand, researchers have demonstrated that Web-based information systems can also have a negative impact on workers. People feel pressured by the real-time demands created by the non-stop presence of the Internet. They also sense of loss of communication and relationships created by virtual communities and meetings, relationships based on physical and face-to-face meetings and conversations.

This research described herein attempts to evaluate the impact of a Web-based collaborative technology on a single small business organisation in terms of how employees viewed its impact on time, changes within the organisation, and their sense of control.

### The study

In January 2000, a contract service business organisation made the decision to adopt a Web-based collaborative technology for the purposes of enabling knowledge sharing within the firm. The business was composed of three divisions with about 250 employees. This company was organised as a traditional, hierarchical business with a functional hierarchy. It was a traditional chain of command, with the vice presidents of each division, chief financial officer and director of human resources reporting to the president. Similarly, managers within each division reported to their respective vice presidents. Therefore, it was not surprising that the culture was more of a top-down bureaucracy with goals and norms coming from the top. Historically, this organisation had experienced several major layoffs as business declined over the past ten years. Therefore, the climate of trust and loyalty, as well as general morale within the employee ranks, was relatively low.

The industry this business served could be characterised as highly competitive. Thus, the environment was dynamic as many competitors vied for a share of the market. In one division, the market had been declining for a number of years. However, in the other two divisions, there was moderate growth in the industry despite a high number of competitors. However, in all divisions, time was a critical factor since projects were based on research to support government registration of products that were often under patent. The work was highly specialised as knowledge workers in each division focused

on unique areas within the business. These knowledge workers took pride in their unique competencies. Thus, specialisation and traditional division of labour enhanced the efficiency of operations. In addition, each division was almost completely autonomous with its own goals and budget. Thus, the culture did not promote knowledge sharing. Despite working in a competitive dynamic industry, employees did not experience great change and tended to remain in their areas of focused expertise. The culture did not promote change skills.

It was in this environment and culture that the president of the company decided to adopt a new, collaborative technology called BSCW (Basic Support for Shared Work) (<http://bscw.gmd.de>). This was an Internet-based software that was platform independent, requiring only an Internet connection and a current version of a Web browser such as Netscape Navigator or Internet Explorer. It provided a mechanism for employees to share information such as sales forecasts, budgets, marketing, or operational reports in a central repository. This shared workspace could be accessed at any time and from any place with an Internet connection and a login/password sequence. Basically, this system served as a repository where employees could easily download their reports, work-in-progress, client comments, budgets, etc. The system is organised within shared folders. An owner creates a folder such as "Sales Forecast: Division A". The owner of that folder then invites those people he/she wishes to share information with, thus controlling access. Each invited member can then retrieve documents, edit them, version them, and resubmit them. The versioning capability allows the members to see what changes each member made and keep track of different versions. By allowing this information sharing on a virtual basis, employees can work from anywhere, any time and have access to information needed to complete their work. In terms of its benefits to most organisations, it enables the sharing of most forms of explicit knowledge, representing an easy-to-use technology to support knowledge management.

Adoption began in January 2000 with the president, several of the vice presidents and several market development managers. By April 2000, this had diffused to encompass more market development managers, several quality assurance and compliance associates,

and several technicians and secretaries, with a total of about 10-15 users.

At the initiation of this study, there were about 30 users. Thus, the population of interest consisted of the entire user group of BSCW within this organisation. By the completion of the study in December 2000, there were approximately 47 users. A convenience sample was used due to the limited size and specific characteristics of the population. An attempt was made to include the entire executive team as well as the entire product development team in the sample. The remaining users were selected using a quota system as described below.

From September through December 2000, approximately 30 users of the BSCW system were contacted via e-mail to request an interview. Special effort was made to interview the leadership team (top executives), who represented the heaviest users of the system. These individuals included the president/CEO, three of the four vice presidents, and the chief financial officer. In addition, five of the six business development (marketing) managers, who represented low-moderate users, were interviewed, as well as the director of information systems. Finally, from the remaining pool of approximately 37 occasional-moderate users, 20 were selected by using a quota system to represent the remaining functional areas. In total, eight managers, four quality-assurance/compliance, and eight data entry people agreed to be interviewed. During the interview, questions were asked using a survey instrument. Respondents were encouraged to answer freely and openly and were prompted only to keep responses focused on the variables of interest if the conversation began to stray from the topic under discussion. User perceptions about BSCW's impact on time issues, relationships within the organisation, and organisational change (positive and negative consequences, performance improvements or problems, roles and relationships) were explored in these interviews.

## Results

What did these interviews tell us? The introduction of a Web-based collaborative technology appeared to produce a combination of anticipated, unanticipated, desirable and undesirable consequences on

these employees and work life in this small business.

### Impact on time

First, time became an important consideration. From an anticipated and desirable perspective, this Web-based technology helped to save time and improve efficiencies. Several respondents documented specific, quantifiable time-savings from using BSCW to share information and knowledge with their co-workers. For example, one committee member documented a reduction in meetings from once per month to once per quarter. Similarly, several managers and top executives documented a reduction in the number of meetings required in different functional areas and projects, as illustrated by the following quote:

We had projection meetings and those took forever and have everybody who's doing invoicing sitting in a room for two hours projecting what you're going to make for the next month and that was a waste of time. I can now be in and out of BSCW in ten minutes, get my stuff done, and everybody else does the same thing, and it's all right there.

Another typical documentation of time savings were people who said that they could input their information into BSCW rather than making paper copies for multiple people and manually distributing them. Rather, they could have the information available in a central location when they needed it rather than spending valuable time calling or tracking down people to find the information they needed, thus preventing bottlenecks. Because time-to-market pressures were important in this industry, the positive consequences of using this collaborative technology motivated employees to adopt and use the technology. The benefits were readily observable.

Several unanticipated and undesirable consequences included the pressure that many respondents felt from the increased demands of a real-time Web-based system. For example, several respondents expressed their opinion that clients and managers now expected instantaneous turn-around time in projects and reports. Before using Web-based systems, the pace of work was adjusted to mailing documents back and forth. Even with faxing documents, there was an expectation of a lag time. With virtual access to documents, the bar seemed to be raised on both client and management expectations of making corrections to reports or inputting information. Many of the respondents viewed

this as significantly increasing the pressures and stress of work. The unanticipated consequences of additional pressure and stress did appear to cause resistance to the technology.

### **Impact on control and autonomy**

In terms of the impact on feelings of control, the perspectives of management versus employees appeared to be very different. The executives and managers perceived desirable consequences of improved monitoring and control of information and accountability. They could see exactly who input information into the system, when and what was input. This gave them better access to data, as well as an improved understanding the contribution of their employees. The first consequence is best exemplified by the following quote from one of the managers. “It allows managers and top executives to make better decisions by having access to more timely information”. It is well known that the more information that is available, current, and relevant, the better the quality of the decisions as opposed to “educated guessing” based on incomplete information. This fit well with the pre-existing hierarchical bureaucratic culture where managers made top-down decisions. The ability to monitor and control employees contributed to management perceptions of control and power.

However, from the employee’s perspective, the technology produced some unanticipated and undesirable consequences in that some indicated that they felt that “big brother” was watching over them. Most of the respondents indicated that their use of the system was motivated by the fact that they were being monitored electronically. For example, one respondent said:

I know that the president checks to see who’s in there. There’s a log in there so you can tell how many times someone’s been in there. I think he expects them to be in there at least a couple of times a week.

Thus, every contribution to a project was under scrutiny, as well as how often they contributed and when. This produced anxiety in many people. Several respondents expressed this as “management by fear or disincentive”. As expressed by one respondent:

... probably more disincentive than incentives. In other words, the president’s on there, the vice president’s on there, and they expect you to be

on there and be up to date. Those sorts of things. They check versions, they see how long, how frequently you’ve been on there.

There appears to be a consensus in the management literature that truly innovative organisations thrive in a culture of employee empowerment, trust and respect. In this environment, the opposite appeared to be true. Employees felt that they were not valued, trusted, and appeared to be motivated by fear and anxiety.

### **Impact on organisational change**

In terms of organisational change, the observation team did not see any dramatic changes. However, we did observe some subtle unexpected consequences. For example, prior to adopting this Web-based technology, management would monitor meetings and establish priorities for associates in the quality assurance departments. After using this technology for a while, there was a shift in roles and responsibilities in this area. Rather than using a more bureaucratic method of prioritising, the responsibilities shifted to individuals becoming more autonomous in suggesting project priorities. It appeared that those associates were more autonomous and empowered due to this Web-based collaborative technology, representing an unanticipated, but desirable consequence of the system. By improving communication, the system also appeared to reduce bureaucracy. As one respondent explained:

For example if the manufacturing unit receives a client comment about an SOP that needs to be polished, we get some better ideas. And then later on, the analytical unit the next day receives the same comment, then they go in and enter something in the BSCW about it, they’ll go “Oh look – it’s already here and so and so has already started to take care of it” so, the communication’s there without the hands-on person-to-person communication and that’s really great.

Examples like this indicate that there is less need for management intervention when associates can manage their projects more efficiently. This appears to refute the prior section in which we suggest that the culture stifled empowerment and autonomy. However, employees also did mention that their motivation for using this collaborative technology was mainly caused by a recognition that their input was monitored. Once they perceived a tangible benefit from using the technology, they secondarily

appeared motivated to continue using it due to the relative advantages it provided over prior processes. This was from a perceived increase in quality and decrease in time required to complete tasks. Therefore, it could be argued that the nature of the innovation (the technology) itself led to expected, anticipated changes in employee behaviours. Table I summarises these results.

## Discussion, conclusions and reflections

### Communication and relationships

Did this technology change processes, the way people worked, or the manner in which co-workers communicate? In certain respects, using BSCW to share knowledge did exert basic changes in processes and communication patterns as well as resultant performance improvements. First, users had to rethink the way they shared information. In traditional processes, they would copy paper documents, distribute them, and spend significant amounts of time contacting the collaborators to receive feedback. Using BSCW, a new way of communication emerged. Users were now expected to input information and to also take on additional responsibility for checking the system and responding to new information in the system more rapidly than was formerly expected. Communication patterns were thus basically altered, as well as the processes for working on documents and projects.

In addition, patterns of tracking processes and problems were altered in a similar manner. With BSCW, users could now examine trends in processes which were previously unavailable and develop new work patterns to continually observe the new knowledge and act on it in ways that were not used before. Finally, managers also adapted their work habits to continually input relevant

information, train their subordinates to follow these new patterns, and learned to become accustomed to having relevant and recent information available for timelier decision making. Thus, BSCW did appear to alter the way people worked and communicated in this particular case study.

### Time

We also discovered that a Web-based technology such as BSCW could produce profound impacts on how people perceive time. Because information flow becomes almost instantaneous, associates must learn how to adapt to changing client, colleague, and management expectations. Many of the respondents in this study felt an increased sense of pressure from these increased time demands. While we did not explore how associates were coping with these increased time pressures, it represents a very valuable area for further research. From the interviews however, we can infer that most of the people in this study adopted a common-sense approach to these new time demands. The attitude appeared to be “I only have so much time and I can only accomplish so much”. However, these increased time demands may have led to slightly changed communication patterns. Several respondents mentioned that they were more likely to attempt to manage stakeholder perceptions in terms of communicating when to expect output and what the realistic turn-around time would be.

In an era of “always on”, 24/7 information access and input, employees perceived the consequences in different ways. Some respondents saw this as a desirable benefit because they could work on projects at 2 a.m. in their pyjamas if they wanted to, or on a business trip to another part of the world. These respondents tended to be in managerial roles. Other employees who preferred the traditional 9-5 routine perceived this

**Table I** Summary of consequences of Web-based technology on user perceptions

Dimension	Consequence	Impact
Time	Desirable/anticipated	Improved efficiency and reduced time-in-process
	Undesirable/unanticipated	Increased pressure and stress of work
Control and autonomy	Desirable/unanticipated	Managers gained control in monitoring employee performance and increased access to information
	Undesirable/unanticipated	Employees felt they were being watched by “big brother”; increased stress, disincentives to perform
Organisational change	Desirable/unanticipated	Slight increase in employee empowerment and autonomy

‘Evernet’ capability as an intrusion on their personal lives. When they walked out the company door at 5 p.m., they did not want managers or clients to expect them to check their e-mails or the collaborative technology after hours. Most of these respondents were in more clerical or data entry type roles. Thus, perceptions appeared to be dependent on roles, expectations, and personalities.

### **Control and autonomy**

The impact on control was also interesting. This particular Web-based technology tracked input by person, action, and time. Thus, different stakeholders experienced different outcomes and perceptions.

Management had more positive perceptions of the impact of this technology because they had access to needed information any time, and from anywhere. In addition, they could monitor employee behaviours and contributions more accurately. In contrast, associates felt more intimidated by the capabilities introduced by the technology. By increasing accountability, they perceived this technology to create more coercive conditions in the work place. They felt that they were being watched and negatively impacted if they did not input information into the collaborative technology based on the expectations of managers. Thus, again, it was interesting to see the differences in perceptions of the consequences by role.

### **Organisational change**

Did this Web-based information system lead to organisational changes by facilitating organisations that are more organic in structure and can adapt more easily to share information in a timely and co-ordinated fashion? We did observe small changes in the level of bureaucracy and increases in empowerment and autonomy. Because employees and managers had virtual access to information, there appeared to be fewer directives from managers to employees in terms of work prioritisation in one area; quality assurance. This consequence of the collaborative technology was positive and unexpected. Another unintended, positive consequence was that by allowing 24/7 access to information, it appeared to free employees from time constraints of finding information from people during restricted times. Therefore, respondents seemed to feel more empowered to work autonomously on their projects, knowing that the information they

needed was there for them. However, it did not appear to create a significant influence on organisational structure or employee empowerment. As discussed at length in the literature, major changes in the organisational structure come from profound cultural and leadership shifts. In this case study, this collaborative technology was viewed as one tool in specific applications. While it proved beneficial, the technology in itself did not lead to major organisational changes.

Technology is simply an enabler to enhance processes. Because this culture focused so heavily on bureaucracies and top management control and dominance, the consequences of providing a vehicle to share valuable knowledge were limited. Specifically, the positive consequences appeared to be heavily correlated with those areas emphasised and monitored by top management. We would even speculate that if top management stopped monitoring use of the collaborative technology, usage levels would drop significantly. As Morville (2001) asked, “is it a bottom-up enabler of communication and collaboration or a top-down channel for broadcasting official corporate propaganda?” While this case study might suggest a negative motivation for using it, Morville suggests a more positive consequence:

Our analysis of portal search logs shows that 80 percent of queries in a given week are unique. Employees are not all looking for the same thing. They’re looking for tens of thousands of different things. In other words, they’re looking beyond the portal, deep into the untamed intranet environment. They’re looking for stuff produced by their peers.

Thus, a collaborative technology such as this one may indeed lead to true knowledge sharing, given adequate time for diffusion to occur among the social networks.

However, truly innovative use of this collaborative technology would require real cultural change within the organisation that promoted and nurtured knowledge management. This would include a top management commitment to knowledge acquisition and sharing, as well as a culture of trust, respect and true employee empowerment. As Anthes (2000) stated, “changing the mind-set is the biggest difficulty we have”, she says, explaining that commitment has to exist at the very top levels of the organisations. The real use of a collaborative technology is also supported by a reward/compensation structure that

provides real incentives to continually learn and share knowledge to improve processes, reduce costs, and improve quality and customer satisfaction. The lessons learned from Buckman Laboratories (Pan and Scarbrough, 1999) demonstrate that a strong leadership commitment to collaboration and knowledge sharing, combined with a reward/incentive structure that promotes these activities, leads to dramatic, positive, and anticipated consequences in this area.

This study produced some interesting insights associated with time, control and organisational change subsequent to the adoption of a Web-based collaborative technology. Desirable and anticipated consequences included timesavings in projects and processes, increased accessibility to needed information, and the ability of managers to monitor projects and introduce increased accountability. A desirable, but perhaps unanticipated consequence was a subtle shift in the organisational structure, with employees empowering themselves more via the virtual access to information, and less need for management oversight in some areas.

However, some undesirable and perhaps unanticipated consequences included an increased sense of pressure and employee stress from time compression introduced by the Web-based technology. In addition, employees felt that the system allowed managers to watch over them, reducing their sense of autonomy and professionalism. Consistent with the knowledge management literature, this case study suggests that leadership commitment to knowledge sharing, supported by a strong reward system and facilitated by a collaborative technology, is the real prerequisite to true knowledge sharing and the profound benefits from it.

In conclusion, when we reflect on these findings, we recognise that many of them are consistent with the literature. The pressure induced by distributed electronic access to information warrants further exploration in terms of stakeholder expectations and mechanisms needed to prevent employee stress and burnout. The changes in organisational structure may similarly be consistent with the literature. However, this warrants further study to validate suggestions in the literature that collaboration software and distributed networks can lead to less bureaucracy and a flattening of the organisation. Finally, this study produced some interesting results in the profound

differences based on stakeholder group. Again, additional studies could confirm or refute these findings. The small sample size does not lend these results to great generalisability. However, the results from this study do support the research and suggestions of other researchers and points to the need for further exploration in this area.

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