Web-Mediated Communication at Workplace

A Case Study at US WEST Communications

Madhuri Kolhatkar

A Thesis
in
The Department
of
Communication Studies

Presented in Partial Fulfillment of the Requirements
For the Master of Arts (Media Studies) at
Concordia University
Montreal, Quebec, Canada

May 1999

Abstract

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Information technologies such as the Web-Mediated Communication (WMC) are changing the way people think, work, collaborate and coordinate at the workplace. Corporations and organizations seeking to gain competitive edge are looking at Web-mediated communication technologies to make organizational communication more effective. Whereas the impact of Computer-Mediated Communication (CMC) technologies has been studied extensively (Hiltz & Turoff 1978, Sproull & Kiesler 1991, December 1996), the impact of Web-mediated communication technologies on the workplace is relatively a new phenomenon, and as such has received little attention (Jackson 1996). This paper examines the effects of using the intranet-based Web as a medium of communication through a case study at US WEST Communications Inc. — a telecommunications company based in Englewood, Colorado. It examines the human impact on employees at the workplace and discusses the threats and opportunities of Web-mediated communications.

Keywords: Networked Workplace, Computer-Mediated Communication (CMC), Virtual Organization, Web-Mediated-Communication (WMC), Web-based Communication (WBC), Internet, Intranets, Extranets.

Table of Contents

LIST OF FIGURES

LIST OF TABLES

Introduction

The workplace in the agricultural age was the farm where a close-knit family worked together to plow the land. The workplace in the industrial age became the factory and the rolling mill where the workers worked in an assembly line for mechanized production of goods. The modern workplace in the information age is characterized by the presence of the computers and electronic networks which connect them. The information age workers are geographically dispersed people connected with voice mails, faxes, e-mails, wireless and wired telephones, pagers, laptops and computer networks and the Web. If the metaphor for the industrial age was the "assembly line," the metaphor for the information age is becoming the "electronic network." The essential component of the networked workplace contains the e- (electronic) component: e-commerce, e-trading, e-mail, e-forms and so on.

The advances in the new communication technologies such as the Internet and World Wide Web are creating a virtual world of networked citizens communicating with each other via the computer screens. The computer-supported communication technologies such as electronic mail, electronic bulletin boards, on-line conferencing are all changing the way we interact and communicate with each other presumably making us more efficient and marketable information resources for the 21st century. Researchers have hypothesized and are studying how the fusion of networked computers and communications technologies will change the patterns of how we think, work, collaborate and coordinate at the workplace, break down geographical barriers of space and time, and crumble organizational hierarchies (Kiesler 300).

However, the human impact on how these emerging communication technologies are affecting the quality of our lives, our health, our relationships, our ability to comprehend and understand each other better, is little understood or discussed. Whereas the impact of communication technologies such as electronic mail, electronic bulletin boards and electronic conferencing has been studied extensively (Hiltz & Turoff 1978, Kiesler, Sproull & Kiesler 1991, December 1996), the impact of Web-mediated communications (WMC) technologies in the workplace has received little attention (Jackson Online: 2). The Web-mediated communication is providing increased opportunities for many-to-many and one-to-many interactions, collaboration and information exchange that was not present in the old CMC technologies. In the past five years, the intranet-based WMC technology has changed the modes of organizational communication. Intranets today have created a new networked workplace where people interact with each other primarily by networked computers and the Web.

The advent and proliferation of new technologies such as Web-mediated communication have also generated considerable discourses in the academic and the business worlds. The promises of easier, faster, and cheaper communication provides justification for corporations seeking efficiency and productivity gains to invest in the technology. However, social scientists such as Lee Sproull and Sara Kiesler suggest that productivity gains in the networked organization are not so straightforward and beneficial at the individual or organizational levels. They argue that value-added analyses focus only on the efficiency and productivity gain and under-estimate the social effects of CMC technologies that change the interpersonal interactions and create new ways of working

(Sproull & Kiesler 4). Value-added analyses to the innovations in the new communication technologies are only the first steps in the evolution process. The next steps involve examining the myriad ways in which the technologies are adopted and used in the society and the impact it has on the people.

This study examines the human impact on employees when the Web is used as a medium of communication at workplace. It examines the uses of Web-based communication within a single company to gain a perspective of how the opportunities created by the new information age are offset by the threats of some dehumanizing effects on the workers. Finally, the paper offers a review of the survival strategies proposed by the experts in the field on surviving in the networked workplace.

Literature Review

Since 1986, social scientists Sproull and Kiesler have studied the impacts of new communication technologies such as electronic mail in networked organizations and how it is changing the way people work (Connections ix). Although their work provides valuable contributions to the realm of computer-based communication, it focused primarily on electronic mail as a text-based communication medium. Today, the advances in bandwidth technology have made it possible to include digital and multi-media applications such as graphics, sound and video in Web-mediated communications. The Web is opening doors to different forms of communication such as online chats or conversations happening in real-time; e-mail is changing from the text-based medium to a richer medium where people can send scanned photographs and pictures and audio clips.

Two Perspectives –Technical and Humanistic

A review of the existing literature on the impact of the new information technologies in the workplace indicates there are two distinct schools of thought. The first perspective is the technocratic perspective that welcomes every technological innovation for the productivity and efficiency gains it brings. It is based upon seeking immediate gains, developing a competitive edge on the new technology and becoming lured by the ever-increasing speed and power of our tools. The second perspective is the voice of caution, the humanistic view that questions the same innovation with skepticism and critical perspective, and studies the long-term consequences of new technologies.

In their book, Connection: New Ways of Working in the Networked Organization, authors Sara Kiesler and Lee Sproull offer a balanced view on the effects of the new communications technologies in the networked workplace. While recognizing it is difficult to predict the consequences of any new technology, they offer a "two-level" perspective in understanding the impacts. The first perspective is based upon seeking immediate financial gains or Returns-on-Investment (ROI) of the new technology. The second-level perspective provides an insight to the unanticipated consequences of the technology, it helps us understand on how people think and work together in a changing communication environment (3-8).

Sproull and Kiesler observed that corporations who deploy networked technologies at the workplace tend to emphasize the efficiency gains of new technology and underestimate or overlook the possible social effects. Their vision of working in a

networked organization is based upon four principles of universal access to information and cooperation:

- A view of people as people and not users, where everyone is connected
- Open access to people and information where people feel free to offer help
- Open and diverse forums where people can work together
- Policies and incentives that encourage information exchange (Sproull & Kiesler 15).

In a recent book titled, What Will Be: How the New World of Information Will Change our Lives, Michael Dertouzos, Head of MIT's Laboratory for Computer Science, presents an insightful view of the information age from technical and humanistic perspectives of "techies" and "humies" (26). Dertouzos proposes to unite the two perspectives of techies and humies with his vision of an "Information Marketplace," where technology will be used to fulfill human needs, not increase complexity. Dertouzos vision of the unification is best explained in the following diction:

> Techies - Mind your prescriptions for the world.
>
> Humies - Tone down your fears of techno-change.
>
> Step outside your precious castles....
>
> Technology is humanity's child
>
> As is our quest for human purpose... (316).

However sound and balanced his advice maybe, Dertouzos does not fully recognize the frailties of human nature. Human ability to tap the fruits of the technologies is offset by our ability to exploit it for more insidious purposes. In a later section of his book, Dertouzos acknowledges some of the darker side of the information technologies and the human impact such as increased disparity between the rich and the poor (317).

A number of studies have also examined the effects of CMC technologies on the workplace (Foulger 1990; Licklider 4-11; Rice 221-249; Hiltz & Turoff 1993: 427-447). These visionaries predicted how the Computer-mediated communication (CMC) technologies will change the way people think, work, collaborate and communicate at the workplace. Hiltz and Turoff made the following prediction that by the mid-eighties:

> "...computerized conferences, a new form of human communication utilizing computers...will become as omnipresent as the telephone and as revolutionary, in terms of facilitating growth and the emergence of vast network of geographically dispersed persons who are nevertheless able to work and communicate with one another at no greater cost than if they were located a few blocks from one another." (Network Nation 1978: xxi).

This vision was not realized in mid-eighties. It took another decade for the Web and the internet to bring the communication revolution closer to the vision projected here. In a later revised edition of their book, The Network Nation, Hiltz and Turoff accepted that they had been "overly optimistic on the speed at which computer-mediated-communication would be adopted around the world" (xxix).

Today, the nature and form of these technologies is changing so rapidly that it is difficult for researchers to predict their application in our workplaces. Organizations that are trying to capitalize and embrace the Web-mediated communication technologies do not have any models to emulate, or understand what types of changes they should expect from these technologies. The application of this technology is still in its infancy and few working models exist which can help us understand the nature and use of this communication medium.

Scope of the Study

This study focuses on the impact of the Web-mediated communication technologies by examining how the technology is affecting workers in a single organization. It explores the specific impact of Web-mediated communication at workplace by performing a case study at US WEST Communications Inc.—a telecommunications company based in Englewood, Colorado. It also discusses the threats and opportunities created in the aftermath of adopting this rapidly growing medium of communication. As Web-mediated communication is evolving rapidly and changing the workplace communication, the employees are adapting to the changes in ways yet unknown. Easy access to information using the Web is changing the culture of organizational communication. This paper examines the kind of changes employees at US WEST are experiencing at workplace, and the problems that are created by the Web-mediated communication environment. It provides a contextual environment for understanding the humanistic impacts of the technology within a corporation.

Chapter I: Definitions of Terms

The Web-mediated communication (WMC) technologies of internet, intranet, and extranets are referred to as the "three waves" of networking technologies. The "first wave" was characterized by the global access of internet and the growth of World Wide Web (WWW). The "second wave" introduced the intranet to the business community, and the "third wave" introduced the extranets as another new form of electronic commerce and business communication between partners (Goldman 7).

There are many interpretations of the new Web-based communication technologies that make the discussion of their definitions critical to the understanding of the context in which these technologies operate. Some definitions describe the physical elements while others describe the software elements such as programs and protocols. However, no one definition can do justice to the diverse meanings and implications of these networked technologies. As the nature and usage of these technologies is changing, new definitions are going to emerge providing new dimensions to the old terms. This section defines some basic terms that are used in this paper.

What is the Internet?

The internet is the name given to the interconnected set of computer networks around the world (Nielsen 165). The internet of today has evolved from the first computer network known as the ARPANET (Advanced Research Projects Network), developed in 1990s; to a more global network of interconnected computers. The first ARPANET was

designed for the U S Department of Defense in order to transmit information safely between military computers located at different sites in case of war.

The internet is a connections of computers linked by cables and modems, local area networks (LAN), and wide area networks (WAN) to the switched telecommunication network. The internet uses standards such as the HTML (Hypertext Markup Language) and communication protocols such as Transmission Control Protocol and Internet Protocol (TCP/IP) that can transmit data, video and audio to any type of computer hardware.

Today, the internet is referred to informally as the "Net," or the "Web" connecting and linking people around the world. These networks allow people to share documents, exchange files, access other computers, download software, hold discussions sessions and deliver electronic mail (Rheingold 5).

For the purpose of this paper, the internet is referred to as a connection of wired computers that also connects people who interact with each other using these internet wired computers. The convergence of computer, networks and telecommunication technologies provides the media for human communication to occur via the computer networks. Because the computers are connected using the internet, the users of these networks can instantly share and exchange information in a geographically dispersed world.

This paper focuses on human communication that occurs when people interact through the internet or the Web in a one-to-one, one-to-many and many-to-many, and

many-to-one basis, for the purpose of working, seeking information, entertainment, learning, or disseminating information.

What is World-Wide Web?

Although, the internet had been around for over a decade, the technology that brought the internet to the masses is called World Wide Web (WWW). The growth of World Wide Web was instrumental in simplifying the internet. The Web was developed to be a central pool of human knowledge allowing collaborators in remote sites to share information and work on a common project. The physicists and engineers at CERN, European Particle Physics Lab in Switzerland discovered a hypertext system based on standard protocols (HTTP) and Hypertext Markup Language (HTML). This discovery led to the growth and development of easy to use point-and-click applications called "browsers" which allowed people to traverse through the maze of the global Web from their desktop computers (Lee 907).

Whereas the internet-based communications occurs in many forms such as E-mail, FTP, Gopher, the WWW is a repository of ever-growing collection of hyperlinked documents or an on-line library available to anyone in the world who has access to an internet and WWW browser. Mayhew refers to internet as "an electronic pony express, providing a means to move information from one physical location to another...."; and WWW "an online library, storing and providing public access to a huge body of information..." (Mayhew 1).

The Web browsers are the so called "killer apps" which brought the mass medium appeal to the internet. It is easy-to-use point and click technology of the Web browsers such as Netscape that brought mass appeal. Some of the widely known benefits of the Web browser technologies are:

1. Platform independence. The information can be created and viewed across the multiple proprietary computers operating systems, hardware and software. The Web browsers can run on any type of computer that means that information that was available on one platform only can now be distributed to every computer.

2. Information anytime, anywhere. The information can be accessed from the Web browser from any computer anywhere on the Web, without the user knowing if it is coming from Australia, India or England. The internet enables the delocalization of information in an organization. Information can flow in the organizational hierarchy from the centralized and local structures to decentralized and global structures.

3. Universality. Easy-to-use Web browser interfaces with hyperlinks makes navigating the WWW easy and universal. Once the users have acquired the skills for using the Web they could use it in any environment whether they are working on Mac or PC machines.

4. Cost efficiency. The information can be distributed across the WWW at a much lower cost than the traditional paper printing and mailing.

5. Time efficiency. The users can control when they want to get the information. It avoids the manual sorting and distribution network of the traditional paper-based communications.

What are Intranets?

> "An intranet is a corporate network which utilizes internet-based technology. These networks integrate an organization's assets and communication facilities into a single environment accessible to employees but not available to internet users outside of the company" (Hursh 2).

The intranets are the internal corporate networks that use internet-based technology to communicate and share information with its distributed employee population. The intranet uses the TCP/IP protocols of the internet to communicate and distribute information around the entire intranet network and the internet gateways of communications. The technology that prevents an outside internet user from entering the corporate intranet networks is called the "firewall." The intranets are the private roads of the organizational network, whereas the internet is the global information highway for public usage.

The evolution of intranets began in 1993 and since then has been escalating in growth at an exponential rate (Telleen Online: 1-11). According to the study performed by International Data Corporation (IDC), the intranet user population is expected to increase to 133 million by 2001. Ian Campbell and Mark Levitt of IDC report that as of October 1997, 59% of U.S. companies, and 38% of European companies have already

implemented Intranets. These numbers are expected to grow to 77% in U.S companies, and 75% in European companies in the next year. (NUA Internet Surveys 1997).

The promise of intranets is one of corporate collaborations and communications. It allows employees to be connected with each other no matter where they are located or which type of computer they are using. This new communication medium allows employees within the company to communicate and share information, collaborate and coordinate their work on the computer network while being protected from intrusion by external internet users.

Intranets are also referred to as the 'Great Equalizer' in an organization where people have been previously excluded in the traditional communication media (Bertin 62). Previously, most organizations were restricted in using the computer-mediated communications tools like e-mail because of their heterogeneous environment with different hardware and software platforms. Group communication within organizations was hampered due to the limitations of varied computer technologies creating islands of communication. According technology expert Steven Jobs, "Intranets have broken down the barriers within corporations" (Cortese 77).

However, as pointed out in an editorial titled, Good Fences Make for Lousy Intranets, the barriers of the free flow of information in corporation are not the technology but the willingness of the people to share information (Business Week 126). The issue before this study is to examine if the intranets in US WEST have broken down barriers of

information exchange, and promising to improve communication, coordination, collaboration between all the employees connected via the intranet.

Initially, corporations deployed intranets as one-way communication medium, however, as the intranets matured there is an increasing trend to connect the users with the database applications using the Web browsers. Intranets promise the following main benefits to organizational communication:

1. **Information-sharing** - one-to-many flow of information for sharing news and other information. Web author controls what is presented, how it is presented and what links are provided.

2. **Communication** - an interactive two-way or many-to-many, sharing of information where the information flows from one or more users and exchange of information occurs via, forms, E-mail, net meetings, and feedback forms

3. **Collaborations** - where people can collaborate and work together on common projects

4. **Transaction-based interaction** - Web applications allowing the user to access corporate legacy systems, place orders, update records, and make commercial purchases.

Intranets in the context of this paper refers to the combination of intranet and Web-mediated technology used to provide access to corporate information; publish company bulletins, news releases and personnel material; and to enhance employee

communications through electronic mail and discussion groups. The intranets today also include the e-mail capability that provides electronic communication to the employees through the Web browser. Understanding how the intranets are being used and adopted in the workplaces becomes the key to analyzing the human effects of the technology at the workplace.

This paper will examine if the promises and the benefits of the intranets are being realized in US WEST and how the intranet is changing in the way employees work, and interact with one another.

What are Extranets?

By the year 1997, intranets were being expanded to extranets promising the advent of electronic commerce industry. As corporations were being driven to working in a more collaborative environment, the need for business interaction via the intranet became a necessity. Today, business-to-business communication is becoming possible via the extranets. The extranets allows two business partners (e.g. buyer & seller) to work and collaborate with each other electronically via the internet but still operate in a secured environment protected from the rest of the internet or Web users. Most companies are still evaluating the implications of deploying the extranet and trying to understand how they can leverage this technology in a collaborative marketplace. Although the issues involving the use of intranets and extranets are the same, this study focuses on the usage of intranet within an organization.

What is a "Networked" Workplace?

The convergence of the computer and communication technologies has created a new design of the modern workplace where the networked computer is an essential element. There are very few jobs left in today's information age where the workers do not have to interact with the computers. In fact, the ubiquity of the computers at workplaces is rapidly becoming as commonplace as the telephones.

The Internet has connected the workplace into an intricate web of geographically distributed people who are interacting with each other through networked computers, and with wired and wireless communications tools. These tools are accelerating the demand for more information, more technology, more competition and more pressure on the workers. Our increasing dependence on information technologies is reshaping our workplace.

For the discussion of this paper, the networked workplace implies more than just the "wired" office with wired telephones, faxes, and networked computers. Technological connections also include the human connections. Social scientists such as Lee Sproull and Sara Kiesler, who have been studying the impacts of communication technology in organizations, define the networked organization from two perspectives, the technological view and the human view. The technological view of the networked workplace is one in which the computer is interconnected to the pathways of the transmission network such as a Local Area Network (LAN) or a Wide Area Network (WAN) linking databases and computers with people. The human view of the networked

workplace is one where the people are connected with each other in diverse forums to exchange ideas and other resources (Sproull & Kiesler 12).

Web-mediated Communications

Whereas the computer-mediated communication refers to interaction of people—one-to-one, one-to-many, many-to-one, and many-to-many—by means of the computer networks, the Web-mediated communications extend the computer-mediated communications beyond the verbal and textual medium. The nature of Web makes the human communication information rich with text, graphics, and video sound merged into one medium. The Web provides the interface for human communication to occur in variety of forms, text, graphics, images, sound and video. As new developments in network technologies extends the use of Web browsers beyond the personal computers into the realm of Web TV, the lines of broadcast television and Web-mediated communication via the computers will converge into a interactive medium. Consumer electronic companies are rushing to develop the "Internet Lite" which provides access to the Web browser from the home television by making a CD-interactive player function as a Web browser. The WMC communications can extend the mediation model to beyond the traditional computer screens to Web TV, and hand-held personal digital assistants (PDAs) blurring the distinction between computers and TV (Gross *et al.* 102).

The Web also creates new ways of structuring information. Because of its capability for hypertext links, the Web-mediated communication becomes more than just a communication medium for the designers and authors. In the study on, "Assessing the Structure of Communication on the World Wide Web," researcher Michele Jackson

suggests that the basic structure of Web-based Communication is the hypertext link that gives control to the designer on how the user can choose to navigate through the Web. "The use of the link in the creation of Web structure enables the designer to control the potential ways the user can move through the information" (Jackson 9). This distinction is important as it makes the Web-mediated communication an interaction between the speaker and the audience instead of a just a sender and a receiver.

Jackson also suggests that the difference between CMC and WMC is that CMC uses an interactional mode of communication such as e-mail and computer conferences, but WMC uses a presentational mode of displaying Web-sites with hyperlinks defined by the author. The communication needs of the Web user are driven by the strategic placement of the hyperlinks. The hyperlinks control the navigation patterns of the Web user (7).

Another important distinction between CMC and WMC is that computer-mediated communications such as USENET and commercial America Online (AOL) services are or can become proprietary, but WMC communications is a universal medium and therefore scaleable to a larger population. This scalability and universality of the Web in addition to its inherent richness in media provides a great potential for a common global communication network. The Web-mediated communication is rapidly becoming the ubiquitous medium of communication in the corporate workplace environment.

The Web also unified the interfaces of different computers systems such as Mackintosh, Windows and UNIX. These different systems could not communicate with

each other effectively. The Web is the universal medium that allows platform-independent communication to occur among users of different computer systems. The easy to use, point and click navigation of the Web-mediated interfaces make the technology accessible and available to a larger number of employees at the workplace.

What is a Virtual Organization?

The current trends in the computer and communication technologies are bringing people, organizational assets and ideas together in a "virtual workplace" that spans organizational and geographic boundaries. There are varied definitions of a virtual organization offered by experts in the existing literature. Some visionaries have imagined a virtual organization as a transient workforce working where "..rather than retaining full-time staffs for some functions, corporations will use network to shop for talent - subcontractors and adhoc teams or individuals to work on a project or act as an virtual department..."(Verity 80).

The concept of a "virtual office" began when the electronic networks and internet created a networked community, removing the barriers of time and geographical space, and allowing workers the mobility to work from anywhere with their computing and information technologies. The Web provides increased opportunities for people to work in virtual communities without interacting on a face-to-face basis.

A virtual organizations can take many shapes and forms – relationships can be temporary or permanent – virtual communities can be created on the Web as and when the needs of business change. The study of Robert Kraut and other researchers suggests

that what makes a virtual organization is a matter of degree rather than a unique structure. They prefer to call it the "virtualization" of organization when important processes occur outside the traditional organizational boundaries (Kraut *et al.* 4).

Others theorists have defined virtual organizations as "... a geographically distributed organization whose members are bound by a long-term common interest or goal, and who communicate and coordinate their work through information technology" (Ahuja & Carley 2). The key element of a virtual organization is the degree of informal communication that occurs amongst its members.

Internet technology expert, Howard Rheingold, in his book The Virtual Community, uses biological imagery to explain the growth of cyberspace "... as a social petri dish, the Net as the agar medium, and the virtual communities, in all their diversity, as colonies of micro-organisms that grow in petri dishes" (6). The Web-mediated communities are similar to the colonies of micro-organisms growing in the petri-dish.

This paper examines how the virtual communities of interest are growing in US WEST and explores its impact on the workers who work in a geographically distributed environment. It examines if the concerns of workplace alienation are justified for the virtual workers in the US WEST.

Web as a Mass Medium

With the overwhelming growth in the numbers of people using the internet, it is surprising that the traditional researchers of mass communications ignored studying the potential of internet as a medium of mass communication. The Web-mediated

Communication (WMC) is an extension of the traditional Computer-mediated Communication (CMC) technology. This paper brings the discussion of internet and intranet into the realm of mass media in the context of the workplace environment. Communication researchers who have studied the traditional forms of mass media such as television, radio and newspapers have ignored exploring the impacts of internet. The discourse in mainstream mass media and the theories of mass communications have excluded any discussions on internet as mediated technology (Morris & Ogan 2). Whereas the business researchers saw computer as a technology for mediating communication and were concerned about its effects, the communication theorists considered internet communication as resembling inter-personal communication and therefore any discourse on internet was relegated to other domains such as education, engineering, computer and information science. However, the rapid growth of internet populations challenges the traditional definitions of mass media. Morris and Ogan point out that the global reach of internet makes it necessary for mass communication researchers to rethink internet as a mass medium (3).

Perhaps what makes internet different from other mass media is that it demands more interactions than the passive consumerism of the traditional media. The content on the internet is not static and linear like radio, newspapers and TV; it is more interactive in nature. Whereas, traditional media offers content information to its 'consumers', the internet requires its 'users' to build the content from a large and distributed online library of linked computers. John Browning describes this new media as 'communications for all, by all.' He states that the old media divided the world into producers and consumers;

either author or reader, enabling one-to-many communication. The new media gives everyone a chance to speak as well as to listen enabling many-to-many communications where many speak back (Browning *et al.* 105).

Chapter II: Methodology

This research used a case study approach to examine the impact of Web-mediated communication within an organization—US WEST Communications Inc., a telecommunication company based in Englewood, Colorado. A Web-based survey was conducted within the organization to gather data from the workers. In addition, to the questionnaire, an interview was also conducted with the Chief Information Officer (CIO) to understand the corporate vision and strategy for deploying the Web-mediated technology within US WEST.

A case study approach was adopted to evaluate the impact of Web-mediated communication in a telecommunications company that is at the epicenter of intranet explosion. The following definition describes the advantages of performing a case study in the contextual setting.

> "A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (Yin 13).

Web-Based Questionnaire

Since the goal of the study was to understand how the workers in US WEST are using the Web-based intranet, a Web-based survey method was selected for data gathering. A Web-based survey is an online questionnaire providing interactive features such as pull-down lists and text entry boxes for making selections and providing feedback. Participants can use this online questionnaire to send responses via the internet

or intranet. The Web-based survey can be administered on using the Web-browsers on the internet or intranets. The Web-based surveying technique was chosen for this study as it is a very cost-effective, and quick method of data gathering.

The Web-based surveying is relatively new method for data gathering. The Web-based surveying technique was introduced to the Web community in January 1994, by the Georgia Tech. Graphics, Visualization, and Usability Center (GVU). The GVU web survey team has now completed its 10th Web-based survey on internet demographics and usage (GVU www-survey 1999). Despite the growth in the number of surveys now conducted on the Web, very little scholarly research is reported about this new technique for data gathering (Smith 3). Although, the field of electronic surveying is relatively new, the Web-based surveying is rapidly gaining popularity among the researchers collecting statistics about internet usage population. The introduction of online forms distributed on the Web in the form of HTML (Hypertext Markup Language) surveys turned the Web into an interactive two-way medium of obtaining information.

As with any other data collection methods, the Web-based surveying approach has its advantages and limitations. Some of the advantages and disadvantages of the Web-based surveys are outlined below for a better understanding of the results.

Advantages

The intranet surveys can be conducted using E-mail, Web-based survey forms posted at Web sites or a combination of the two methods. Comparative studies on the use of internet and e-mail as a means for data gathering as opposed to mailed surveys, have found that there is a major advantage for e-mail both in terms of speed and cost of data collection (Comley 2; Mehta & Sivadas 429).

The Web surveys provide more features over the e-mail surveys and less opportunity for human errors as it uses graphical user interface elements such as checkboxes, selection lists and selection buttons to make choices. The users are allowed data entry fields to enter responses. In an e-mail survey, the users can use the ASCII text form to enter information that may or may not be pertinent to the question asked. This makes analysis more difficult and reduces the validity of the responses.

The internet and intranet technologies offer many advantages for performing online surveys to gather usage data on the net users. The advantages offered by internet and intranet over the traditional paper and telephone surveys techniques are faster results, reduced cost, high response rate, reduced opportunity for human error, and quick follow-up on responses.

Faster Results

E-mail and the Web provide a quick way of getting responses from users. As businesses become more and more competitive, management needs to make decisions in shorter timeframes. The Web-based surveying is gathering popularity as internet user

population is increasing. Researchers are finding that the Web surveys can provide more rapid rate of responses than the traditional mail-in postal surveys.

Lower Costs

The internet reduces costs of deploying surveys e.g., postage and paper costs, telephone interviews and the related labor intensive costs, and also the cost of manual data entry process common to mail-in surveying. The new costs are the creation of effective online survey and the database to gather responses.

Higher Response Rate

A study performed at Louisiana State University which compared the effects of respondents of electronic versus paper based survey found that the respondents viewed electronic forms as more interesting, more enjoyable and more important than paper-based surveys. Donna Mitchell who performed the study found that not only are people more likely to answer the questions online, they also tend to be more candid in their responses. The GVU labs have also noticed a similar trend with increased response rate from respondents for Web based surveys (Pitkow & Kehoe 106).

Reduced Error Rate

The Web-based survey reduces the number of errors users can make in typing their responses as it provides a form where they can select predefined choices, in scrolling lists, pull-down menus and radio buttons. The responses can be edit checked before they are submitted to remove some possibility of error. The manual data entry is eliminated for both the respondent and the researcher. The Web survey can be adopted to get a set of specific follow-up questions based upon the user's answers. This technique provides

more customization of the survey responses dependent upon the type of answers received to previous questions.

Disadvantages

The Web also presents some unique problems for researchers. The main issue is whether the Web-based survey excludes any section of the user population. Developing an understanding of these limitations was critical for this study. The Web naturally excludes the users who do not have access to the technology. As all the users cannot or choose not to participate in the survey, it reduces the chances to generalize the results to the entire population. When evaluating the results of this survey, an effort was made not to generalize to the entire user population but only to indicate a trend analysis. This study focuses on the analyses of the responses identified by the users of the technology in US WEST.

Sampling and Self Selection

The main problem of Web-based surveying technique is the concern whether the sample is representative of total user population. The Web is a difficult environment to identify the sample size of the user population. There is no central index where all the users are identified. Defining a sample which is representative of the population is difficult, since it is difficult to know how many people are actual users of the Web. There are two types of sampling methodologies, random and non-random. The random sampling occurs when all the participants have an equal chance of being selected. A non - random sampling occurs when the participants are not selected randomly. This means that the entire population does not have an equal chance of being selected. The random

sampling becomes difficult on the Web. Since it is difficult to identify the actual size of the target population for random sampling a non-random sampling method based upon self-selection by the participant was adopted for this survey. The quantitative results of the survey may not truly represent the total population. However, the qualitative data gathered still help us understand the impacts and usefulness of the technology.

It should be noted that the issues of self-selection on Web-based surveys are also found in any self-administered paper-based survey. The participants have to make a choice whether to respond to the survey or not. While self-selection occurs in almost every survey methodology, it is important to note for a Web-based survey the self-selection is limited to the users who have access to the Web. Self-selection occurs when a user is given the opportunity to volunteer to be a participant, and respond to the questions on his or her own accord.

At the time this survey was conducted, the total number of US WEST intranet users across the company ranged from approximately 20,000 to 30,000 workers. Therefore the target audience for the survey were the users who had access to the intranet and who used the self-selection process to respond to the survey.

Knowledge of Web Technology

The Web-surveys assume that the user population is knowledgeable on the Web techniques to respond to the survey. This reduces the participation of novice users who have access to the technology but do not know how to use it. This limitation is slowly disappearing as more and more users are getting on the corporate intranet, Web literacy is increasing at a rapid rate making this limitation non-existent.

Accessibility Issue

It should be also noted that the survey only reached the workers who have access to the intranet services, those workers who do not have access to the media were naturally excluded from participating in the survey. This exclusion was expected as the intent of the survey was to focus on the workers who use the technology today, and study their patterns of usage. The survey was designed for the workers who have used the intranet technology.

US WEST Intranet Web Usage Survey (1997)

The Web-based questionnaire for this study was developed using the hypertext markup language (HTML) with an easy-to-use form-based user interface and hosted on the prominent intranet Web sites at US WEST. The responses were gathered automatically using the Lotus Notes database. The survey was posted on US WEST Web sites "Global Village" and "IT Connections" during the period October-November, 1997.

Questionnaire Design

The purpose of the survey was to gather information on employee profile, usage patterns, communication tools, and the impact on the workplace. The questionnaire covered the following dimensions:

- **User Profile:** This section covered questions such as whether the users were employees or contract workers, their positions in the company, and which organization they represented. This data was required to define the characteristics of

the user population and their background. Often the background of the people and the position they hold in the organization helps explain their usage of technologies.

- **Web Usage and E-mail Usage:** The section covered the usage patterns of the users such as the browser usage, intranet and internet usage, the frequency of use, e-mail frequency of use, telecommute patterns, activities performed, and communication tools used. It also included questions on the number of years of experience users had with the internet and intranet technologies. These questions would help us understand the expertise and level of comfort of the users and also help identify how their work places are changing e.g., if intranet facilitates people from working from home and different locations creating a distributed but connected working environments.

- **Primary Uses of the Web**: This section asked the users what types of activities and tasks they were performing using the US WEST intranet and the frequency of each activity. A list of common activities was provided and the frequency of use for each type. The users were also given an opportunity to add any additional activities that were not listed in an open-ended section of the question. This question was aimed at identifying what were the primary uses of the intranet and which types of applications were frequently used.

- **Communication Tools**: This section listed the common communication tools used and asked the users to identify the frequency of use for each tool. The response to this question indicates if the workers are changing their communication tools and habits of interacting with each other. The Web-mediated communication is a relatively new

tool of communication and the intent was to explore its usage pattern and whether it has taken priority over other traditional communication tools such as telephone or fax.

- **Problems:** This section listed the common problems encountered on the Web and asked the users to rate how frequently they came across these problems. The users were also provided an open-ended area for comments on defining other problems.

- **Impact on the Work:** This section covered 6 different statements on impact at workplace and asked the users to rate whether they agreed or disagreed with the statements. The statements covered area such as job usefulness, information access, and workplace loss of human contact.

The questionnaire began with an introduction that provided information on the purpose of the study and why the data was being gathered and how it will be used. Users were assured that their individual responses would be kept confidential. In addition instructions were provided on completing the questionnaire. An e-mail address was included in case the participants had any comments or questions on the survey. The users were informed that the results of the study would be posted on the Web site.

A total of 12 questions were asked and the estimated time for completion of the survey was approximated at 5-10 minutes during the pilot-testing phase. A sample of the questionnaire is included in the Appendix section of this paper.

Participants

Participants were solicited by using the following approach:

- The Web-based survey was advertised and hosted on the most prominent intranet Web sites at US WEST e.g., Global Village and IT Connection. The Global Village is a Home Page for US WEST Communications corporate intranet network. The IT Connection is the Home Page for the US WEST Information Technologies Inc. An hyperlink was added on these sites which linked the user to the Intranet Usage Survey. When the participants clicked on the hyperlink 'Intranet Usage,' they were taken to the survey site where they could complete the survey. The location of the Web-site provided visibility and convenience for the users who visited these sites to participate in the survey. The participants self-selected themselves to respond to the survey. No additional incentive was provided to complete the survey.

- E-mail announcement was sent to all workers who have access to e-mail. On the last week of the survey the e-mail reminder was also sent to the US WEST Information Technologies employees.

- Announcements and advertisements were also made in other intranet Web sites.

Procedure

The following procedure was used for data gathering:

1. The research proposal was submitted to the Communications Director of US WEST Information Technologies and the Director of Intranet Services group for approval to host and sponsor the survey in the US WEST intranet Web site.

2. The Intranet User Survey Questionnaire was designed and developed using HTML online forms features. The survey was pilot-tested to identify and correct usability problems.

3. A database was developed using the Lotus Notes Domino server capabilities. The data captured was automatically sorted and presented in 55 spreadsheet views.

4. The survey was deployed from October 7 through November 7, 1997.

5. The data was automatically recorded in the Lotus Notes database.

6. In the last week of the survey, an e-mail reminder was sent to the employees who had access to the e-mail services.

7. Results of the survey were tabulated and analyzed.

8. Personal interview was conducted with the CEO of US WEST to share the results of the study and understand the corporate vision on the intranet Web technology.

Chapter III: Culture at US WEST Communications

Background

US WEST Communications Inc. is a telecommunications company headquartered in Englewood, Colorado, and employs over 47,000 people in United States and around the world. It provides a wide range of telecommunication services to over 25 million customers in 14 mid-western states: Arizona, Colorado, Idaho, Iowa, Nebraska, Minnesota, Montana, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington and Wyoming. US WEST Communications is one of seven Regional Bell Operating Companies (RBOC) commonly known as the baby bells in United States, which was created after the divestiture of AT&T in 1984 (US WEST Proxy Report).

In the early 1990s when telecommunications and cable companies across America were busy building their cable networks to create the "Information Superhighway", another major technology change was occurring with the growth of internet. Instead of waiting for the "super" highway to be built, the internet and World Wide Web were bringing the "Information Highway" to people's homes and offices using the existing telephony. As the demand for being connected via the internet and modems was growing, the telecommunication companies saw an unexpected growth in the request for additional telephone lines by residential and business customers wanting to connect with other computer users. The telecommunications companies were slow in realizing the potential of internet, but their focus began to change towards the capitalizing the information market with the internet. In 1993 US WEST Communications saw its access line growth rate of 5.0% for business customers and 3.2% for residential customers (Annual Report

1993). The internet played a big part in this surge for more phone lines: people were setting up home offices and requesting extra lines for modems and faxes, and businesses were demanding more Integrated Voice and Data Networks (ISDN) lines for Internet access (Sullivan 160). Telecommunication companies like US WEST soon realized that they had limited their focus on cable TV as a means for providing interactivity and overlooked other markets such as internet access.

In 1995, Dick McCormick, the US WEST chairman and Chief Executive Officer conceded that, "we may have initially narrowed our vision on interactivity by overemphasizing on the cable & TV set. We are now considering other platforms like computers and the exploding internet" (US WEST Today 1996).

In 1996, US WEST began expansion of its network bandwidth to include fiber-optics and other digital technology such as Digital Subscriber Line (DSL) to provide the capability of delivering information at higher speed. The 1996 Telecommunication Act opened doors for the local phone companies in United States to enter and compete in the long distance market in exchange for opening its local loop for long distance companies. This landmark legislation opened the floodgates of competition and court battles for the telecommunication companies fighting for the lucrative markets of long distance services and internet access.

Pushed by the advancements in the communication technologies, US WEST began changing its image from being just a dial-tone provider to a Web-tone provider making internet available to its consumer community (US WEST Annual Report 1998).

Intranet Web Initiative

The intranet was developed in US WEST on a limited budget and with much skepticism by the management. Before the launch of the Web-based intranet, the TCP/IP network connections were already in place in US WEST, but its use was limited to technical staff in the research and development groups. In 1993, US WEST Communications embarked upon an ambitious re-engineering effort to become more competitive in the marketplace by streamlining its operating costs, replacing its outdated systems, re-engineering its core business processes, and upgrading the network. The telecommunications regulation laws in United States were undergoing historical changes as local monopolies for providing telecommunications services were crumbling and competition was setting in. During these turbulent times, US WEST executives were confronted with the immense challenge of how to communicate and share the corporate vision of the future with all the employees dispersed in its fourteen states and around the world. Inspired by the five disciplines of Peter Senge, (Senge 1993) visionaries such as Margaret Turney, who was then a Vice President of financial operations scraped $100,000 for the Global Village project. Sherman Woo, Director of Information Tools and Technologies sought to create a Web tool called "The Global Village." In late 1993 early 1994, US WEST joined the ranks of the intranet pioneers by launching its first internal Web site called "The Global Village." The Global Village began as a grassroots effort and quickly became the corporate initiative for intranet. The company officials claim that the estimated Return on Investment (ROI) on the intranet is 1000% (Sliwa 14).

The US WEST Global Village is a Web window on the life within US WEST and a gateway to access the external World Wide Web. Since its creation of US WEST Global Village other intranet Web sites in the company are growing at an exponential rate, as every day new sites are added to the corporate network. During this evolutionary process the intranet in US WEST is undergoing major social and cultural transformation. The US WEST intranet Web is changing from being a one-way communication tool within the company to a more interactive tool using Web forms, e.g., "Rumor Mill" Web sites which allows employees to anonymously question senior executives about issues and concerns, share latest rumors in the company. The "Rumor Mill" provides employees a forum on the intranet Web to ask questions directly to any senior management and receive a prompt reply. The anonymous nature of discussions and question and answers possible on the intranet indicates potential signs of the democratization on the Web and the breakdown of hierarchy within the bureaucratic organizational structure (Sprout 161).

This early initiative along with developments to internal communication facilitated by key enabling technologies allowed US WEST to use the intranet to meet departmental, inter-departmental, and corporate-wide communication needs. The key enabling technologies driving the growth of intranet were:

- Proliferation of computers at workplaces
- Increased connectivity using existing networking technology of LANs and WANs
- Inter-operability and open network architecture protocols of TCP/IP
- Online publishing standards like HTML

- Easy to use Web browsers like Mosaic and Netscape

- Firewall security protection software tools.

In 1996 US WEST launched the "Intranet Initiative", Dave Laube, (Vice President & Chief Information Officer at US WEST Information Technology Inc.) outlined a phased approach to the intranet deployment in US WEST explaining how it will change the way we do business (Laube 1996). Laube's vision for intranet deployment within the company was as follows:

- Stage 1 will focus on information distribution, authoring and broadcasting network. It will include employee access to news, corporate policies, standards and practices.

- Stage 2 will focus on communications and transactions, providing employees access to job postings and common e-mail system.

- Stage 3 will focus on rapid application development, providing easy-to-use, Web-based interface.

- Stage 4 will focus on customer access to all US WEST products and services (US WEST Today 1996).

Later in this paper, a recorded interview with Dave Laube is provided to review the results of the intranet survey. The results revealed whether the technology lived up to the expectations of the senior management at US WEST, and what unanticipated issues emerged with the growth of the technology.

US WEST saw the intranet as an effective communication technology which can contribute to reducing its operational costs and increasing employee productivity. The corporation viewed the intranet Web as a medium for communicating to the employees. The Global Village Web site was used by the management for:

- Providing corporate and industry news via the "Employee New Network."
- Enhancing a sense of virtual community via the "Rumor Mill" Web site where anyone can share rumors and ask questions to the senior management.
- Looking up employee benefits, job and training programs.
- Seeking and giving technical advice via a discussion forum from anyone in the company.

The Global Village has become a corporate Web-mediated communication vehicle for distributing policies and standards through the company network. Despite these pioneering efforts, what remains to be seen is if the Web-mediated communication can democratize the organizational communication, or if the intranet Web within US WEST has become yet another mouthpiece of the corporation where the information flows in the one-to-many paradigm. The question for this study will be to explore if the intranets have allowed the employees to become active partners and collaborators in the decision-making process of the corporation.

Chapter IV: Results

This chapter describes the results of the Intranet Web Usage Survey conducted in November 1997, at US WEST Communications Inc to understand the impact of Web-mediated communication at workplace. The results from the survey are analyzed and tabulated in the order in which they were presented to the participants.

Key Findings

One of the main findings of the survey was that the respondents were spending a significant proportion of work time using the Web. Considering that the intranet Web has been introduced in the US WEST workplace only 5 years ago, it appears that it has already changed the work habits of the workers who responded to the survey. Also of significance is the difference between intranet usage and e-mail usage. The responses indicated that Web-mediated communication is rapidly becoming the primary communication tool at the workplace. More than three-fourths or 76% of the respondents reported using the Web more than 1-4 times a day. The e-mail usage also showed a high frequency of use, almost 78% of the users reported checking their e-mail every two hours or more, and 92% reported using e-mail frequently for business communication.

Furthermore, the results suggested that the most frequently performed tasks on the Web were: e-mail (85%), searching for technical information (61%), surfing the net (69%), and obtaining training (69%). In 1997, activities such as collaboration and participating in discussion groups were still not popular with the users, 61% of the respondents reported that they do not use the Web to collaborate, and 91% said that they

have never participated in discussion groups. At the time this survey was conducted the new Web applications such as "Updating Employee Information" online were being introduced to the Web community. However, 65% of the respondents said that they never used any Web applications to perform any transactions or make any changes to their employee information.

The respondents identified the following problems on the intranet Web in an open-ended section of the survey:

- Outdated Information - This indicates that despite the company objective of providing the users with most up-to-date information possible with the Web technology, the reality seems that the effort to keep the information current online seems to be a difficult goal to achieve. Online information needs to be currently maintained to provide the value to the workers.

- Poor Navigation - Respondents said that it takes too long to find the information they need. This indicates that despite the access to the intranet and the Web technology, the workers at US WEST still find it difficult to find the right information at the right time. The Web is a new medium of distributing information, making the needed information it easily available to the users seems to be still a difficult task. These results challenge the claim of the Web technology to bring about increased efficiency at workplace. If the users cannot find the information at the right time, can the new technology claim the efficiency gains promoted by management? This issue could

also be tied to the poor designs of the Web sites making it difficult for users to find the information they need quickly.

- Slow Search - The speed of access was another problem that affected the users negatively on the Web. At the time the survey was conducted, the search engines on the Web were still in their infancy phase, as a result the users could not locate the information they need. These problems are discussed in detail later in this chapter.

The overall impact of the intranet on the respondents was positive. The usefulness of the Web sites to the jobs received positive responses, 85% users were in agreement that the intranets provide useful information to their job. Survey respondents did not think that the Web has reduced their personal face-to-face interactions. The results from this survey provide an insight on how the intranets are working within an organization, and what kinds of problems or issues are emerging with its growth.

User Demographics

At the time this survey was conducted the total number of employees at US WEST was 60,000. In 1998 the company's cable and telecommunication units split into two separate entities US WEST and MediaOne. The total employee population today at US WEST Inc. is approximately 46,000 people. The total number of workers in US WEST Communications who had access to intranet in 1997, was approximately 35,000, this figure included both leased workers and employees. The contractors commonly known as the leased workers are also included in the survey as they also have access to intranet. The fluctuating numbers of the contractor makes it difficult to identify the exact

number of users who have access to the intranet. Therefore the results of this survey should not be considered as representative of the total end-user population, but only serves to provide a trend analysis.

A total of **1,322 users** responded to the Web-based survey. Of the respondents 95% were employees and 5% were leased or contract workers. The employees at US WEST are classified into two broad categories -- management and occupational. The management employees include technical, management, and administrative staff who are have different employee benefits and coverage than the category of occupational staff. The occupational employees are often members of the Communications Union of Workers (CUW) associations. The survey was distributed to both the management employees and the occupational employees who have access to the intranet technology. Of those who responded, 78% were management employees and 17% were occupational employees. The low response rate from the occupational employees could be because these employees have restricted access to the intranet and internet Web.

User Position

The majority of responses 78% were received from users who belonged to the management positions. Only 17% of the occupational employees responded to the survey. Figure 1, illustrates the job positions of the respondents and indicates that the management employees have more access to the Web technology than the occupational employees. The division between the employee position reveals the nature of hierarchy does not disappear with the advent of the Web technology. The corporate policies determine who has or needs access to the technology. The intranet Web has the potential

to provide a universal medium of communication, the usage may be more controlled by the policies of the organization rather than the capabilities of the technology.

The vision that Web-mediated communication flattens organizational hierarchies depends upon the policies of the individual organizations. It depends upon the willingness of the organizations to provide intranet and internet access to all employees. The restrictions on access for the occupational users at US WEST is that due to their nature of work, the internet access is not considered critical.

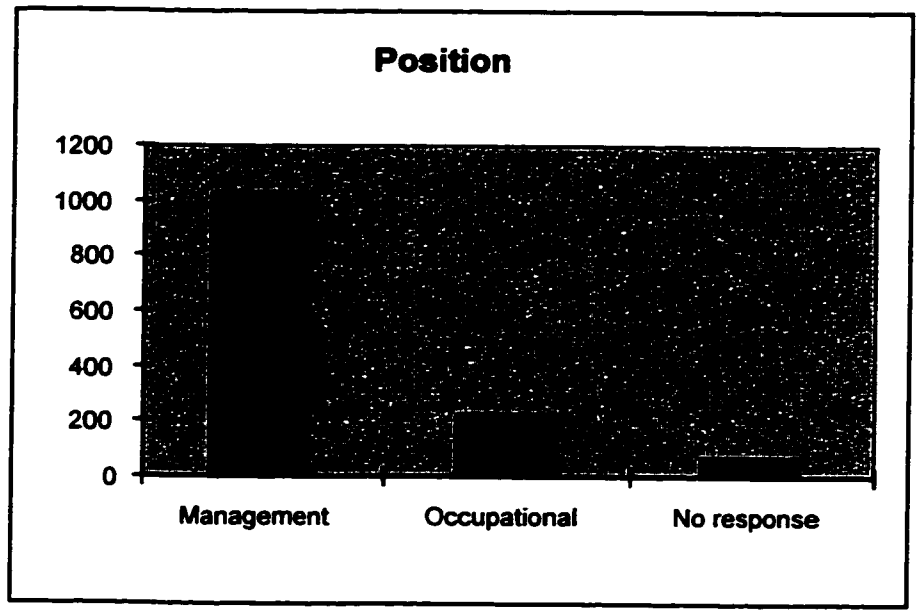

Figure 1: User Position

Web Browser

Which Web browser do you usually use at work?

In 1997, the corporate standard for Web browser was Netscape 3.0 plus or 4.0 Communicator. The results indicated that the US WEST standard for Netscape was widely adopted by the users, 97% of the respondents said that they use Netscape as their primary browser at work.

Table 1: Web Browser

Browser	Number	Percent
Netscape	1278	97%
Internet Explorer	10	1%
Other	25	2%
Total	1322	100%

E-mail Service

Which e-mail service do you usually use at work?

Of those who responded, 83% use Netscape's Netmail as their primary e-mail service. Netscape is the Web browser environment for accessing e-mail. Only 10% of the respondents said that they use Lotus Notes, and 4% said that they use other e-mail services such as Office Vision, Profs, UNIX mail, Microsoft Outlook Express. This indicates that Web integrated e-mail is the primary e-mail environment for workers.

Table 2: E-mail Service

E-mail	Percent	Number
Netmail	83%	1089
Lotus Notes	10%	137
ccMail	2%	29
Other	4%	56
Total	100%	1311

Experience on Intranet Web

How long have you been using the US WEST intranet Web sites?

More than half of the users who responded have 2 years or more experience using the intranet, 54% said they have used the US WEST intranet for 2 years and more, 31% have used it for 1-2 years.

Table 3: Intranet Web Experience

Length of Use	Number	Percent
2 yrs and +	703	54%
1-2yrs	409	31%
6 mths -1yr	144	11%
Less than 6mths	56	4%
Total	1312	100%

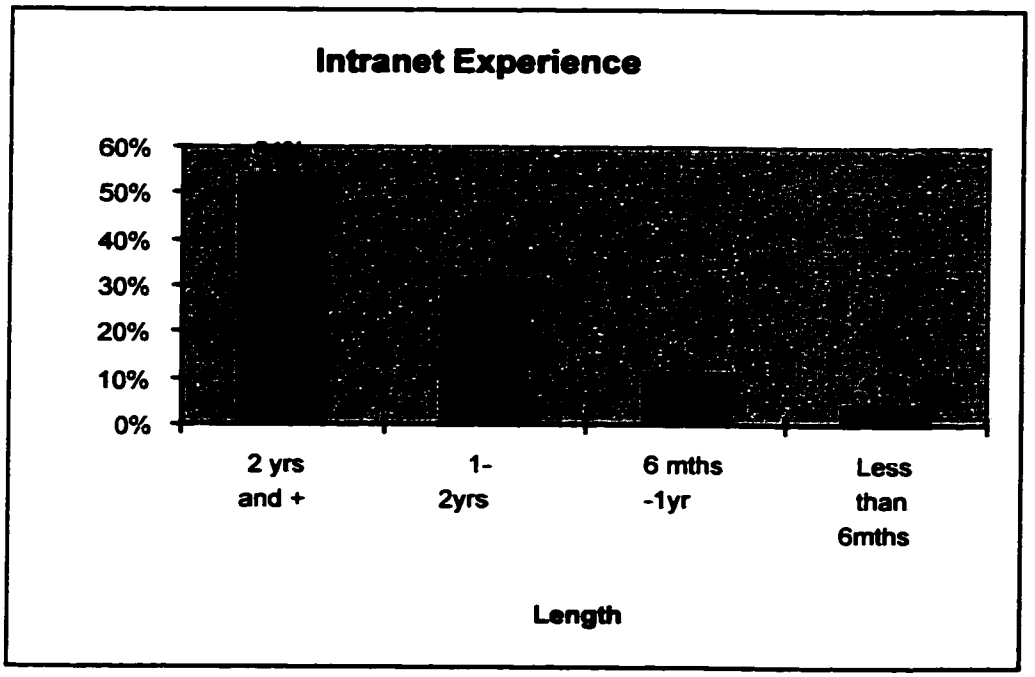

Figure 2: Intranet Web Experience

Intranet Web Usage

On average, how often do you visit the US WEST intranet to perform a specific task?

More than a third of the respondents, 37% use the intranet about 1-4 times a day, 21% use it 9 times or more during the day, and 18% use it 5-8 times a day. In other words, more than three-fourths of the users, 76% are using the intranet with a frequency of more than 1-4 times a day. This high frequency of use indicates that the intranet has become a vital tool in workplace environment. These results were also consistent with the WWW usage where 45% of respondents use the Web 1-4 times per day.

*(*url:http://www.guv.gatech.edu/user_surveys*)*

Table 4: Intranet Frequency of Use

Frequency of Use	Number	Percent
Once a month	33	3%
Once a week	66	5%
Few times a week	220	17%
1-4 times / day	481	37%
5-8 times/day	238	18%
9+times/day	279	21%
Total	1317	100%

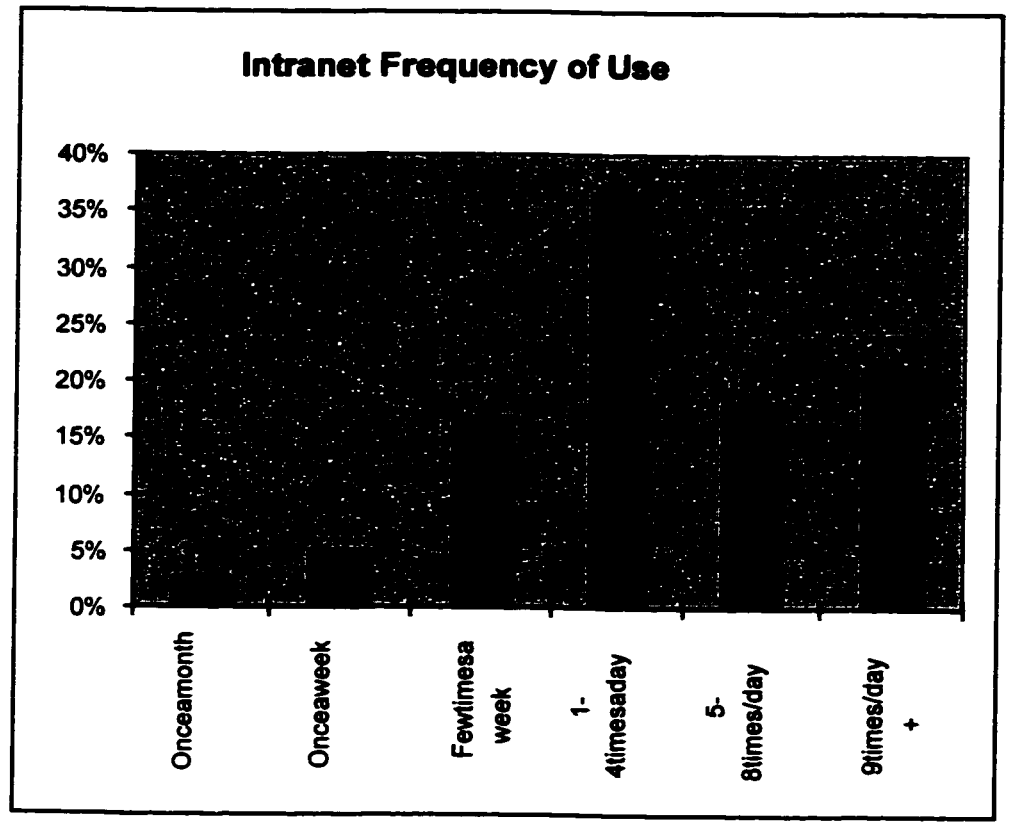

Figure 3: Intranet Web Frequency of Use

E-mail Frequency of Use

On average day, how often do you check your e-mail?

The e-mail is one of the most popular applications offered by the intranet technology. The results indicated that the respondents are spending a significant proportion of their work time using the e-mail. More than three-fourth of the respondents (78%) said that they check their e-mail every two hours or more. The frequency of use of e-mail seems to be high among the respondents: 27% check it every 2 hours, 21% check it every hour, 18% check it a few times in the hour and 11% check it every 15 minutes or more. Comparing these figures to paper mail delivery, which is delivered twice a day, e-mail seems to have become a predominant means of communication with a high frequency of use. It appears that users tend to communicate more frequently today than what is allowed by the traditional postal mail delivery systems.

The high frequency of use of e-mail could be perceived as a blessing as well as a bane. The implications of constant usage and popularity of the e-mail system is also offset with some potential problems such as e-mail overload, monitoring of employees, receiving unsolicited e-mail or "spamming," and disruption of work. These issues are discussed in detail in the next chapter.

Table 5: E-mail Usage

E-mail Usage	Percent	Number
Once a day	5%	68
Twice a day	17%	222
Every 2 hours	28%	365
Every hour	21%	278
A few times an hour	18%	233
Every 15 min.+	11%	146
Total	100%	1312

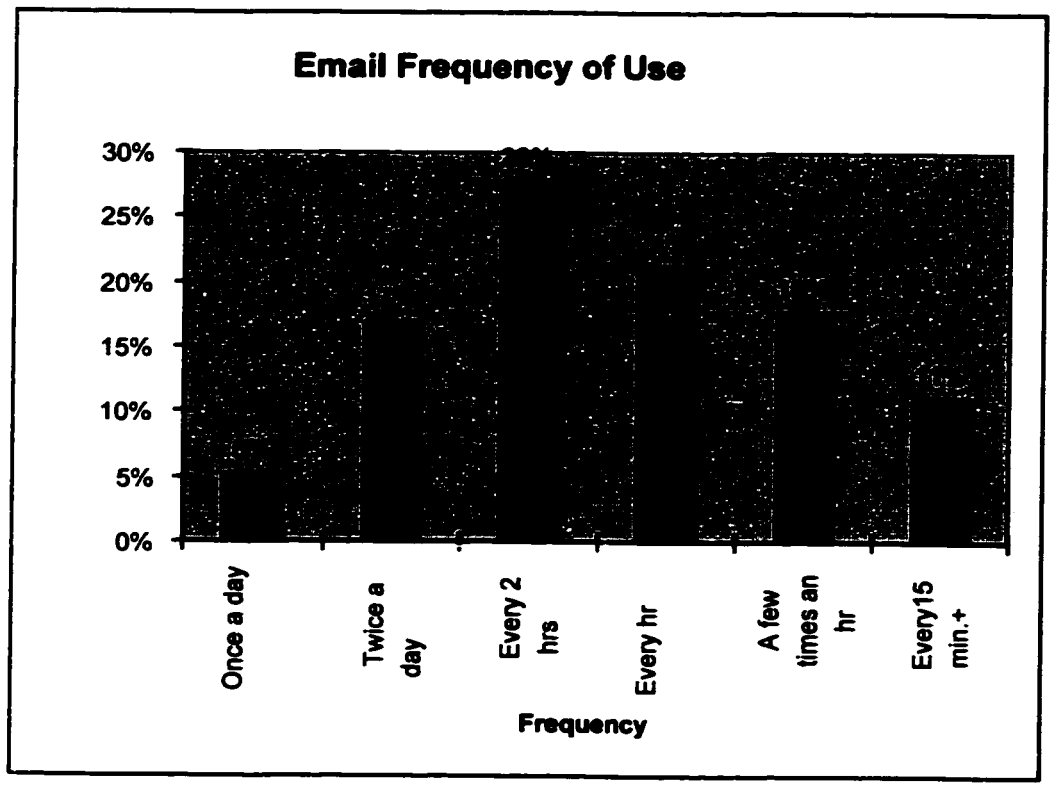

Figure 4: E-mail Frequency of Use

Location of Use

From which of the following locations do you access the US WEST intranet Web? (Check ALL that apply)

- Primary work location
- Secondary work location
- Home
- On business trips (e.g. Hotels, Conferences)

Most of respondents access the intranet from their primary work location (99%). In addition, 43% also access it from home, 12% also access it from a secondary work location, and 13% also use it during business trips. 68% users also access intranet from different locations indicating that there may be shift in the traditional workplace. According to Hamilton, companies do not talk about "work at home" programs anymore; they talk about "*work anywhere, anytime*" (Hamilton 117). This may be the trend for the emerging virtual organization discussed earlier. This result indicates that the concept of flexible workspace seems to be expanding beyond the traditional offices to more geographically distributed environment.

Telecommuting

How often do you telecommute i.e. work from home?(Choose one)

- Never
- Once a month
- Few times a month
- Once a week
- More than once a week

Although 40% of the respondents reported that they do never telecommute, 25% stated that they telecommute at least once a month, 21% reported as telecommuting a few times a month and 7% said they telecommute more than once a week. This trend for telecommuting indicates that 59% of the workforce telecommute sometimes during a month. It should be noted that in US WEST there is no official policy on telecommuting, it is entirely dependent upon the decision of the management.

Table 6: Telecommute Frequency

Telecommute Frequency	Number	Percent
Never	527	40%
Once a month	323	25%
A few times month	279	21%
Once a week	83	6%
More than a week	98	7%
Total	1310	100%

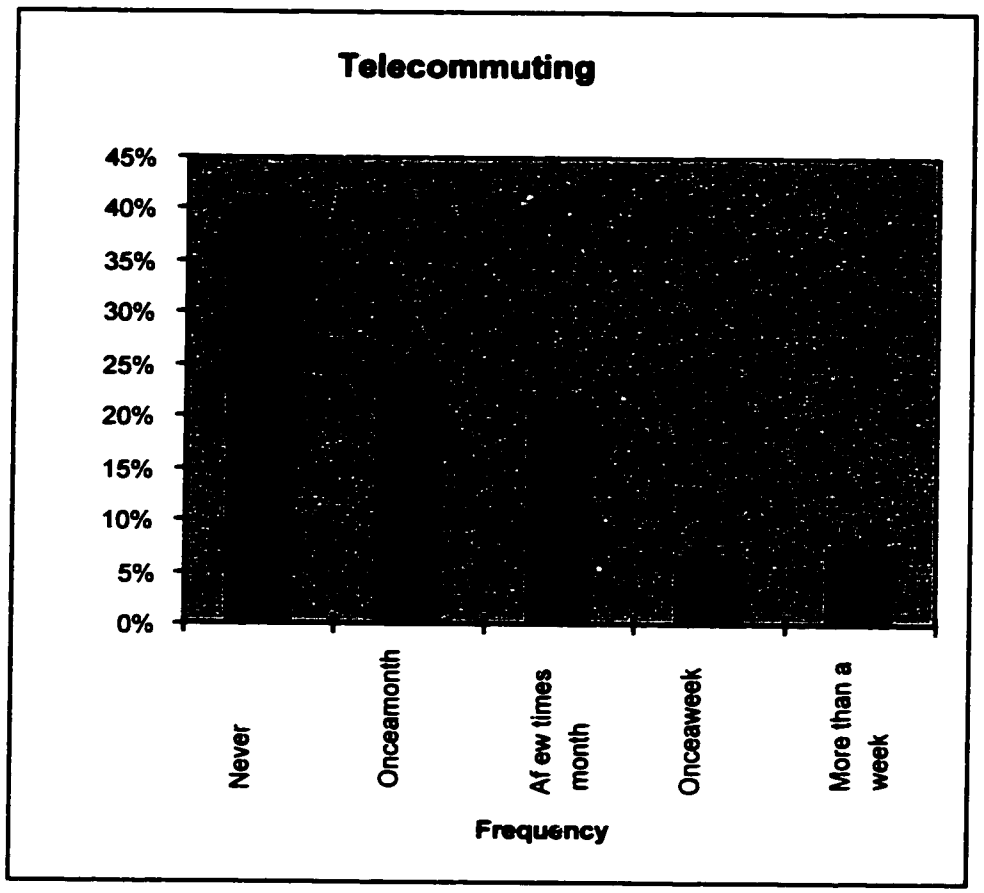

Figure 5: Telecommuting Frequency

Facilitation of Telecommuting

Does access to US WEST intranet facilitate your decision to telecommute?(Choose one)

- Yes
- No
- Does not apply

Of those who responded, 46% stated that intranet access facilitates telecommuting, 18% indicated that it does not, and 36% reported that the question was not applicable. These results indicate that the intranet provides the technology that allows telecommuting, but the organizational policies may still govern the actual impact on workplace. Later in this paper, the corporate policy on telecommuting is discussed in more details.

Table 7: Facilitates Telecommuting

Facilitates Telecommute	Total	Percent
yes	605	46%
no	237	18%
n/a	466	36%
Total	1308	100%

Primary Uses of the Web

How often do you perform the following activities using the US WEST intranet Web?

Never Sometimes Frequently

- Browse intranet Web sites
- Search for information
- Provide information, e.g. feedback forms
- Use e-mail service
- Participate in online discussions
- Download files, software etc.
- Obtain training
- Use Web applications, e.g. pay phone bills
- Publish information, e.g. develop, design and manage Web sites
- Collaborate online, e.g. project tracking
- Surf external Web sites
- Other

Respondents stated that the most frequently performed activity on the Web is e-mail, 85% of respondents said that they use e-mail most of the time. In addition 61% of the respondents also search for information, and 39% reported frequently browsing the intranet Web sites for work or general purposes. Activities that are performed sometimes include, providing information to others (76%), surfing the internet (69%), and obtaining training (69%).

The biggest surprise was that the interactive capabilities of Web technology such as collaboration and participation in discussions groups were not reported as significant uses among these respondents. Of the respondents, 61% reported that they do not collaborate online, and 91% said that they have never participated in online discussions. Similarly, the commercial usage of intranet Web-based applications (e.g., paying US WEST

telephone bills) has not yet become very popular among users, 65% said they never use any Web applications, although 31% reported using Web applications sometimes, and only 4% said that they use Web applications frequently. This indicates that the intranet in US WEST had not fulfilled the promise of becoming a collaborative tool as expounded by the technologists and theorists.

Table 8: Activities and Frequency of Use

Activities	Frequently		Sometimes		Never	
E-mail	1117	85%	95	7%	95	7%
Search	798	61%	497	38%	16	1%
Browse	508	39%	752	57%	50	4%
Download	262	20%	849	65%	196	15%
Surf internet	161	12%	876	67%	263	20%
Publish	158	12%	303	23%	834	64%
Provide info	155	12%	985	76%	156	12%
Collaborate	82	6%	419	32%	791	61%
Train	70	5%	901	69%	328	25%
Use Web appl.	50	4%	400	31%	843	65%
Discussions	13	1%	108	8%	1181	91%

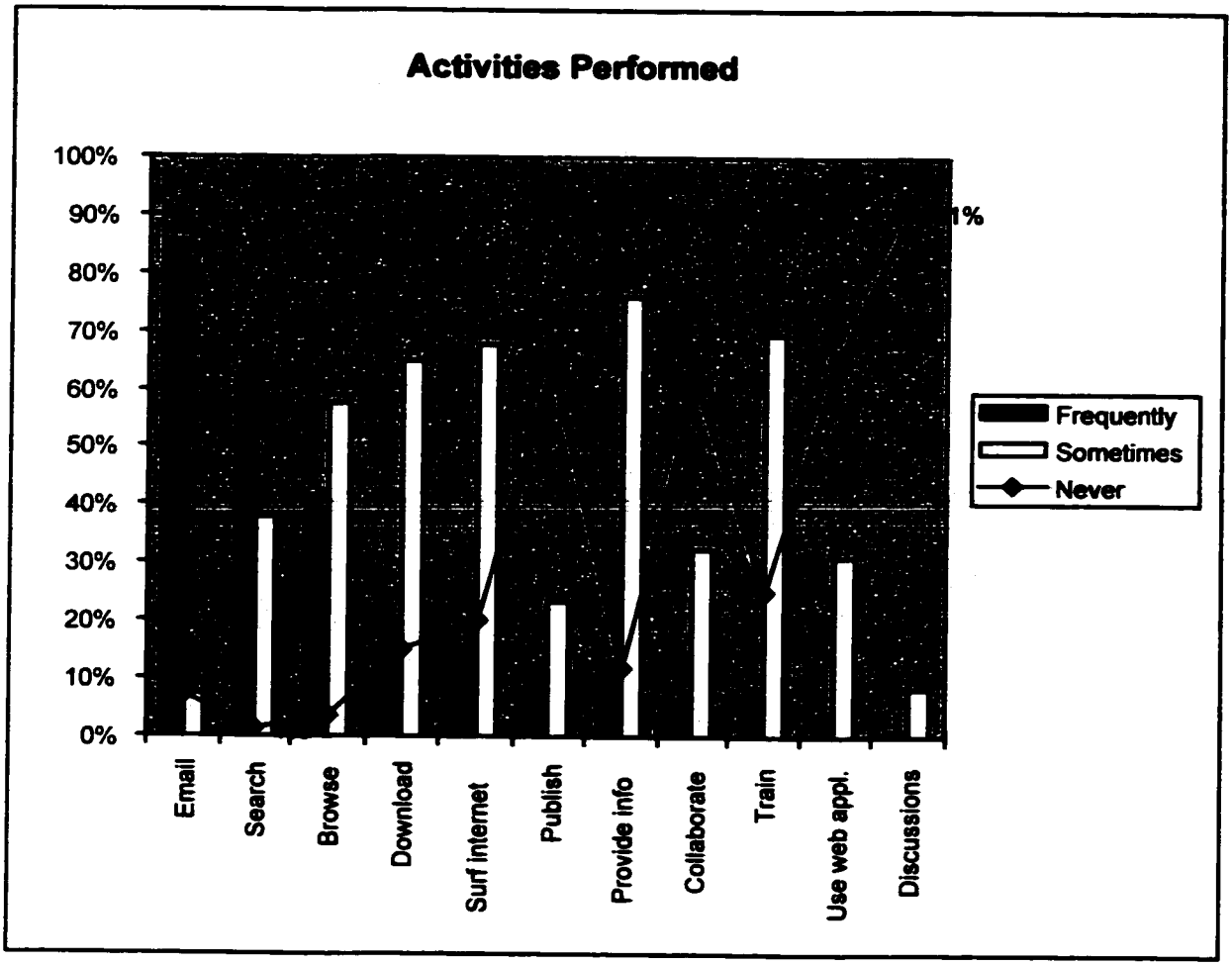

Figure 6: Activities Performed

Communication Tools

How often do you use the following tools to communicate at work?

Never Sometimes Frequently

- Intranet Web sites
- Video-Conference
- E-mail
- Voice Mail
- Fax
- Pagers
- Telephone
- Wireless/cell phone
- Inter-office mail (paper)
- Face-to-face meeting
- Other

The respondents indicated they use e-mail with almost the same frequency as telephones, with 92% reported that they use e-mail frequently, whereas 89% reported that they use telephones frequently. Although, this difference in percentage is not significant, it makes e-mail a comparable tool to telephone in usage. Face-to-face meetings were used frequently by 45% of the respondents. The use of snail mail or inter-office paper-based communication once a primary form of communication has reduced considerably to only 14% of the users using it frequently.

These responses indicate that e-mail has become the primary communication tool at workplace along with telephones. It appears that workers in US WEST are interacting more frequently using electronic communication than face-to-face. The long-term effects of this electronic interaction may need to be observed in a more longitudinal study.

Table 9: Communication Tools and Frequency

Tools	Frequently		Sometimes		Never	
E-mail	1200	92%	93	7%	14	1%
Telephone	1164	89%	89	7%	50	4%
Voice-Mail	1122	86%	126	10%	52	4%
Pagers	627	48%	567	44%	109	8%
Face-to-face meet.	578	45%	661	51%	56	4%
Fax	473	36%	759	58%	71	5%
Intranet Web	443	34%	618	48%	231	18%
Paper	184	14%	868	67%	241	19%
Wireless phone	160	12%	528	41%	602	47%
Video-conference	21	2%	548	43%	713	56%

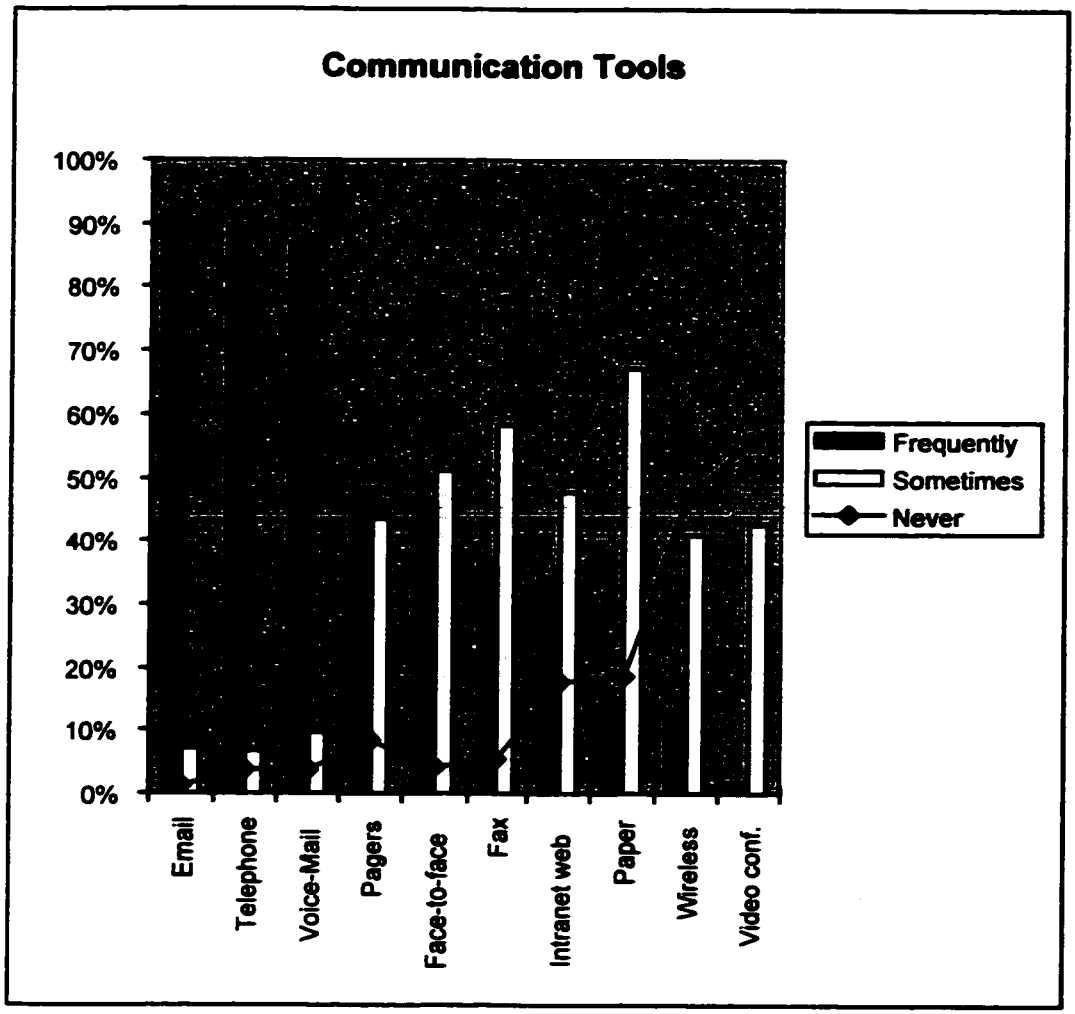

Figure 7: Communication Tools and Frequency Of Use

Problems Found

How often do you experience the following problems using the US WEST intranet?

Never Sometimes Frequently

- It takes too long to find the information you need
- It takes too long to view/download the pages
- Not finding the information you need
- Information you find is not what you expected
- Information is not updated
- Feeling lost or not knowing where you are
- Links are broken
- Other problems

The most frequently occurring problems identified by the respondents were as follows:

- Takes too long to find the information (13% frequently)
- Takes too long to download pages (9% frequently)
- Not finding the information (11% frequently)
- Information is not what was expected (10% frequently)
- Information is not updated (22% frequently)
- Feeling lost (10% frequently)
- Broken links (6% frequently)

The outdated information on the US WEST intranet seemed to be a problematic issue for the respondents. Other troubling issues reported were slow response time to access information and finding the right information at the right time. These finding were also supported the World Wide Web user survey conducted by Georgia Institute of Technology's Graphics, Visualization and Usability Center (GVU) where the 69.1% of the users reported that it takes too long to view and download information on the Web (Pitkow & Kehoe 108).

Table 10: Known Problems and Frequency of Occurrence

Problems	Frequently	Sometimes	Never
Too long to find info	13%	79%	9%
Too long to download	9%	66%	25%
Not finding Info	11%	81%	8%
Info is not what expected	10%	82%	9%
Info is not updated	22%	71%	7%
Feeling lost	10%	45%	45%
Broken Links	6%	75%	19%

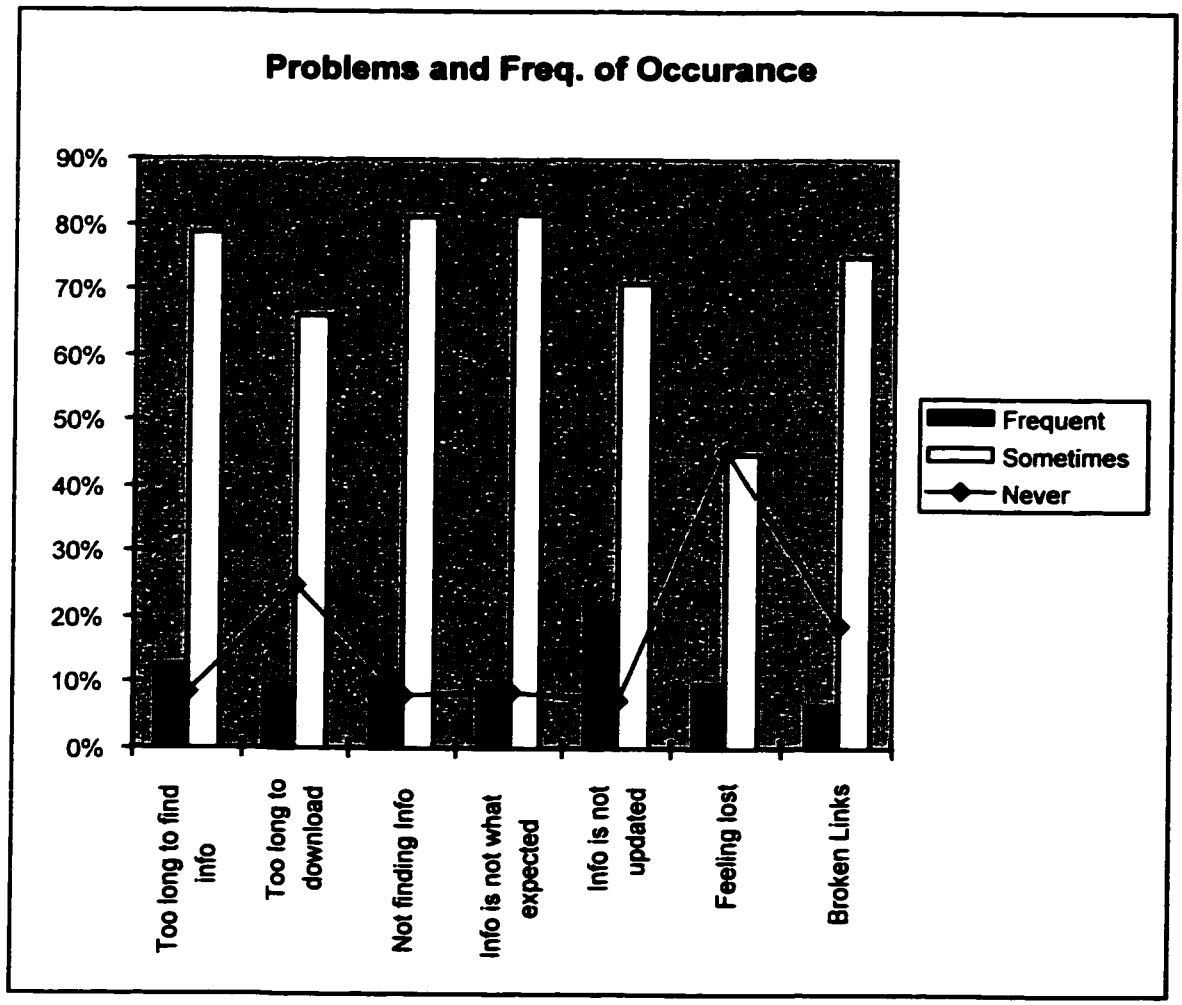

Figure 8: Problems and Frequency of Occurrence

Other Problems

From the 1322 respondents 214 users identified additional problems in an open-ended response section called "Other Problems." This open-ended question was directed at obtaining more qualitative data rather than quantitative data. Almost 256 problems were reported by 214 users. These responses were grouped into 11 individual categories. The problems were assigned to each category, and the number of responses indicates the number of times the same problem was reported:

Table 11: Other Problems

Other Problems	# of responses
Poor Web site designs	26
Content (e.g., emphasis on "cute", vs. content)	32
Maintenance (e.g., info is not current)	18
Indexing problems (e.g., no central index)	12
Search problems	33
E-mail(e.g., irrelevant E-mail is sent to everyone)	21
Speed (e.g., time of day, accessing from home)	52
Lack of training and support	22
Access for occupational employees	14
Information overload (e.g., wastage of time)	7
Technical problems	19

Impact of Intranet Web

Please read the following statements and check one for each response. (Strongly disagree to strongly agree - 5 point Likert scale)

- Overall I find the US WEST intranet Web site easy to use
- I find getting access to company information is easier since the intranet.
- My awareness of company news and events has increased since the intranet access.
- The information I find on the US WEST intranet Web sites is useful to my job.
- With intranet access, I am able to communicate with people I would not meet face-to-face.
- I feel a loss of personal contact with my colleagues because of the intranet access.

It appears that the overall impact of intranet in the workplace has been positive with 63% of respondents reporting that they find the intranet Web easy to use, 43% agreeing that it is easier to access information about company news with intranet access. The intranet has also increased the organizational knowledge of the workers, 81% agreed that intranet access has increased their awareness of the news and events in the company. It appears that intranet technology has changed and improved communication flow and information-sharing in the workplace. Respondents were also in agreement that the intranet Web provides information useful to the job, 48% agree and 37% strongly agree on relevancy to the job.

With regard to the possible loss of human contact with other workers, 46% of the respondents disagreed and 22 % strongly disagreed with the statement that they feel loss of personal contact. This means that 68% respondents do not feel that Web-based intranets have lost reduced personal contact with colleagues. This result collaborates with the research findings of Professor Linda Harasim who found that computer networking does not replace other forms of human communication, it increases the range of human

connectivity and the number of ways in which we are able to make contact with others (Harasim 16). Contrary to the predictions that net will make the workers become more isolated, these respondents did not seem to think that they were losing touch with their colleagues because of intranet usage. The intranet appears to have enhanced their communications patterns, it has not replaced the personal touch that occurs with face-to-face interactions. The issue for future research study would be to investigate if workers over the years tend to use the Web as their primary form of communication, and abandon other forms of communications, thereby increasing the possibility of isolation.

The overall impact of the intranet Web on the workers appears to have been positive with 86% of the respondents in agreement with the statement that the Web has made corporate information quickly and easily accessible. The relevance and usefulness of the Web also received positive response with 85% respondents in agreement with the statement that intranets are useful to their jobs.

The availability of the Web-mediated communications at US WEST workplace appears to have increased the amount of information available to the workers thus having a positive effect on their organizational knowledge. Although, it appears that US WEST has not yet become a virtual organization where workers interact with each other solely through Web-mediated communication technology, access to the Web has augmented organizational communication. Nevertheless, there were some respondents who perceived the volume of information as having a negative effect on their working patterns. The open-ended sections of the survey provided respondents a chance to indicate their

perception of being overloaded with information. It maybe too early at this time to study some of the long-term consequences of the technology.

Table 12: Impact on Work

Impacts	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Easy to Use	1%	3%	12%	63%	21%
Access to info is easier	1%	3%	9%	43%	43%
Increased awareness	1%	5%	13%	45%	36%
Info is Useful to job	1%	3%	12%	48%	37%
Communicate with people	2%	8%	26%	43%	21%
Loss of contact	22%	46%	24%	6%	2%

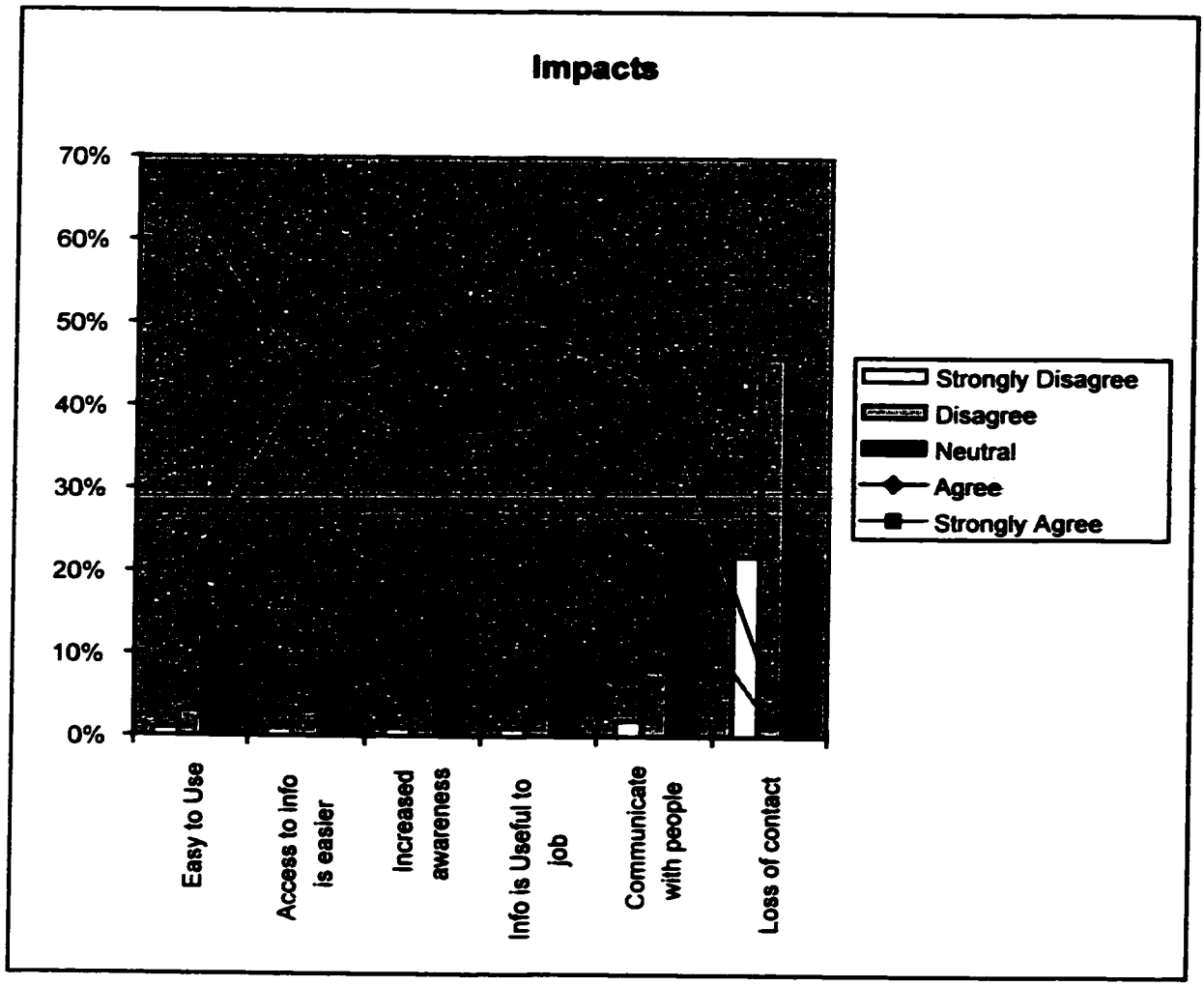

Figure 9: Impacts on Work

Chapter V: Discussion

The results of this study indicate that US WEST is undergoing a transformation in workplace fired by the change brought about by the Web-mediated communication technology. Based upon the responses of workers in US WEST, this study provides us some interesting glimpses of a Web-mediated workplace and the future trends of the technology. Although it is not yet clear where all this change leading, the study generates a discourse on the impacts of the Web on the workplace and the opportunities and threats it creates. The following issues are discussed with on the basis on the existing literature and the results of the study. Both sides of the issues are presented to provide a critical analysis on each topic.

Impact on the Workplace

According to this study, it appears that the overall impact of the intranet Web in the US WEST workplace has been positive. Majority of the users in US WEST agreed that Web technology has changed and improved communication flow in the workplace. In addition majority of the respondents 85%, stated that intranet Web sites provides them information useful to the job. With respect to the speed and ease of access to information on the intranet, 86% of the respondents said that the intranet Web has made corporate information available quickly and easily. Though it is difficult to generalize on the basis of this case study, the responses indicate that the promise of the intranet Web such as "faster, cheaper and easier" access to information and communication may be the realized by the employees and the management. The adoption of the technology seems to be

providing the immediate gains of faster access to information and cheaper distribution if information.

Opportunities and Threats

> "For every solution in cyberspace there is always another problem to solve" (Verity 97).

As businesses are realizing the value of intranets and Web-mediated communications at the workplace they are also facing some interesting challenges, this study indicates that like with all other technologies, the intranets have solved a number of problems but also created new ones. The Web-mediated communication networks at workplace provide a medium of endless possibilities that can enrich or complicate our work experience. Researchers are just beginning to understand the long term-effects, the opportunities, limitations and issues raised when people use the computer networks to facilitate and structure human communications processes (Hiltz & Turoff 43).

The following sections discuss some of the opportunities and issues raised in the course of this study.

Decentralized Organization and Democracy at Workplace

The Web-mediated communications promise to break down the organizational pyramid. The access to the networking technologies of the Web and internet are perceived as becoming the "Great Equalizers," that break down corporate commands (Bertin 62; Sager 100). In the industrial age, the hierarchical management system was needed to track people and the work they did. In the information age, the computer

networks have the capability to track the work people do, as a result the management is expected restructure the institutions horizontally (Roszak 161).

The internet and intranets seem to provide a perception of democratization of institutions making it difficult to suppress information flow. The equitable access provided by the intranets in networked corporations promises a horizontal flow of information leading to a dramatic shift in the roles and responsibilities across organizations. Managers and employees can exchange information easily without going through a filtering process of middle-management. The intranets allow a two-way flow of information rather than the top-down flow common in traditional organizational hierarchies.

This study revealed that in 1997 not all employees in US WEST had equal access to the intranet. This could be because the intranets were not fully deployed throughout the company. However, the low response rate from the occupational employees indicates that not all users have equal access to the Web. Only 17% of occupational employees responded to the survey, whereas 78% of the respondents belonged to the management community. It maybe the nature of the work which prevents the occupational employees from participating in the Web interactions. The distribution of information in US WEST was from a top-down approach, where workers of the occupational communities were not yet involved in the Web-mediated communication process. It was clear that the organizational pyramid had not quite crumbled in US WEST in 1997 when the survey was conducted. This study indicates that organizational hierarchy can only be flattened is

only possible if the management policies of types of access and work environment caters the free information access and flow possible through the intranets.

There are also indications that corporate cultures do not necessarily reward the employee behavior of sharing information. Technology Consultant, Thomas H. Davenport Jr. of Ernst & Young, recognizes the potential benefits of new technology in breaking down communication barriers and allowing employees to share information. But, he also points out that the corporate cultures consider sharing ideas as an "unnatural act"(Sager 107). It is evident that the use of these technologies in the workplace and the cultural changes in management policies will affect the human behavior of the networked workers.

From the organizational perspective, Sproull and Kielser have suggested that there are some good and bad effects of electronic communication, "giving voice to voiceless and opening a window on the corporation can produce bad effects as well as good ones" (Connections 101). Their work indicates that although the effects on the individual employee can be beneficial, computer networks can also create undesirable consequences for the employers, such as flattening of hierarchies. Employees who could not previously express their views and opinions to the management directly can now do so freely by e-mails. This not only becomes potentially undesirable for the management, but from the employers' standpoint it can increase organizational costs (79-101).

The findings from this study indicate that although are some signs of democratization of communication such as the use of US WEST Web site called, "Rumor

Mill" which is designed to establish a sense of open communication forum for the employees and the management. This site allows employees to ask questions, share rumors and express their issues and concerns. The "Rumor Mill" maybe used to provide a voice to the voiceless, but the content of some of the responses indicates that management is not overtly pleased about the types of questions asked.

According to Hiltz and Turoff, the logical consequences of computer-mediated interactions for corporate hierarchies is that decisions can be made autonomously at local levels, resulting in more speedy and efficient processes (The Network Nation 142). However, the studies conducted by Kiesler and Sproull in Carnegie Mellon University have revealed that the "increased democracy associated with electronic interactions interfered with decision-making" (Global Networks 109). Based on their studies, Kiesler and Sproull projected that:

> "..in a fully networked organizations of the future task structures may be more flexible and dynamic. Hierarchy will not vanish, but it will be augmented by distributed lattices of interconnections" (ibid. 117).

This study indicates that in a large organization like US WEST, intranets have not yet changed the organizational hierarchies or decentralized the corporate structures. The results from this study indicate that hierarchies still exist. The number of responses to the survey from the management workers which was considerably higher than the occupational workers, indicates that the management workers still control the flow of information and access to information. The issue of amount and level of access to the internet and intranet technology becomes the critical for the understanding

democratization of organizational structures and the shift in the powers of control within the organization.

Web and E-mail Usage

In 1997, the intranet users at US WEST were spending a high percentage of their work hours using the intranet Web to perform their daily tasks. Although, this high usage in itself was not surprising in the light of internet explosion in the world, what was surprising was the small difference in intranet usage and the e-mail usage. Based upon previous studies it was known that e-mail was being increasingly used in corporations, but the growth of intranet Web usage was not expected equally as high. Since the Web-based intranet sites are distinguishable from E-mail, separate questions were asked for intranet usage and e-mail usage. More than three-fourths, or 76%, of the respondents said they were using intranet Web more than 1-4 times a day, whereas 78% of the users said that they check their e-mail every two hours or more. Considering the fact that the Web-based intranet technology has been introduced less than 4 years ago in the corporate world, this high usage indicates that it has become equally as important tool as e-mail at the workplace. Intranets have provided the ability to disseminate and distribute information instantly and overcome the expensive and time-consuming drawbacks of the paper-based communication systems. Of all the predictions and promises of the intranets, it appears that the promise of creating and distributing information throughout the organization has been realized to the users who have access to the technology. Similar results were obtained from the GVU 8th WWW user survey that found that 84% of the users consider e-mail and the Web as an indispensable technology (5).

Email Overload

There is little doubt that the e-mail communication has a mass appeal, the ability to reach people at any time, anywhere is a powerful medium but it has its downside also. Even though e-mail is a popular part of the technology, this study also found that users were getting irate by the number of e-mail messages they receive daily at their workplace. In the open-ended section of the survey, the respondents made the following comments:

- "There is too much junk mail. There are groups that assume everyone is as interested in their special interests as they are, so they send blankets e-mails, decline requests to remove individuals. It is becoming as insidious as the hard copy junk mail at home."
- "We need concise-mail - typical e-mails at US WEST are two pages printed!"
- "Irrelevant e-mail gets sent to everyone" (US WEST Intranet Survey, 1997).

These results are also supported by the studies of Whittaker and Sidner, who found that the success and the popularity of e-mail has also led to high daily volumes of e-mail being sent and received (278). In their studies conducted in Lotus Development Corporation, Whittaker and Sidner discovered that although e-mail was designed for communications application it was also being used for task management and personal archiving creating a problem called e-mail overload. E-mail overload creates problems of managing inboxes, tracking outstanding tasks and daily "to do" lists. The inability to effectively manage information creates a problem of lost information and inability to respond back in a timely manner (277-295).

Although, all communication media can increase the information overload, in a media rich environment of the workplace, the e-mail is often used to "push" information at the receiver. Even though e-mail is considered asynchronous communication media where the e-mail can be retrieved anytime it is convenient for the recipient, this study indicated that respondents in USWEST are retrieving their e-mail every 2 hours or more. The studies performed by Kraut and Attewell in large U.S. based organizations, suggests that the employees who have access to electronic communications such as e-mail are better informed about their company and more committed to its management goals. Furthermore their work revealed that the disruptive effects of interruptions from the Web media and information overload are less likely to negatively impact the workers because the receiver of the e-mail has the ability to control over answering and replying to the e-mail messages (Kraut & Attewell 323).

However, e-mail technology does come with its own price. E-mail technology has also increased the number of computer crimes such as e-mail fraud, "spamming" or sending unsolicited e-mail to everyone and sending computer viruses via e-mails. The electronic equivalent to the junk mail received in the postal mailbox is called "spamming." US WEST has issued guidelines to employees on how to avoid being "spammed" and filters potential spammers from accessing the US WEST network.

E-mails are also prone to monitoring activities, employees are generally not aware that their company e-mails are subject to monitoring by the management. The issue of e-mail monitoring is further discussed in the following section on "Monitoring in the Workplace." It seems that the e-mail technology has been a blessing to the corporate

world, but at the same time it has created a number of problems which affect the way people think and work.

Information Overload

One of the potential consequences of today's Web-mediated environment at the workplace is that it increases the quantity of communication that is initiated, distributed and received. Despite the degree of access to information, the big question for workers is how to find the right information at the right time. Organizing information and making sense of it to create knowledge is a challenging task. The amount of information available at our workplace today and the ease of access to it outstrips the human ability to process the information. This causes a condition called "information overload."

As internet and intranets provide easy access to the vast sea of information, the big challenge for the workers becomes how to process the information and not affect their work. This study reveals that while the users at US WEST are increasing their usage of the intranet, they are also beginning to show signs of information overload. Some of the responses received in the open-ended section of the survey were:

- "information overload - too much to be expected to keep up on - our Web pages have links to other doc's with more links etc."
- "there is no time during the day to get through all the information. I have yet to visit the alternate notification location (non-critical info) where miscellaneous announcements are posted via the Web" (US WEST Intranet Survey, 1997).

There have been many interpretations and perspectives offered on the problem of information overload. Sproull and Kiesler have suggested that the problem of information overload is really a matter of control for attention and the people who complain about it are the recipients of the information, not the senders. "Typically the problem is not too much information literally but the lack of control over information exchange" (115).

Donald Norman on the other hand, states that the problem of information overload in Web is caused by navigation problems where people have no spatial relationship of information – searching a database online is like wandering through a maze of paths. Human memory does not work by navigation but by description. We need to use descriptive retrieval methods to find and locate information – intelligence agents. The flaw, according to Norman, lies in information retrieval technologies such as dictionaries and encyclopedias where alphabetical ordering of information is used instead of functional groupings which makes it necessary to use other tools such as a thesaurus. Norman's goal is to push for a humane technology that has meaning and relevance to human needs, his motto for the 21st century is: "People Propose, Science Studies and Technology Conforms" (263).

According to an article written by Professor Hal Berghel in the Communications of the ACM, the immediate cause of information overload is because the Web is being used to fulfill the dual role of being a private and a public information and communication medium. People are using public networks for communicating private messages. Berghel thinks, that the issues which are important to one person are uninteresting to the rest of the public. "When the background noise of the medium

drowns out most of the useful content for a wider audience, as is now happening on the Web, the effectiveness of the medium is undercut" (20).

On the other hand, William Gardiner, in his book, The Ubiquitous Chip, suggests that the "problem of information overload is a pseudo problem" (192). In an information-rich environment, he points out that the information overload problem can be changed to one of managing complexity. The challenge is how to manage this complexity; how to put this large amount of information into a coherent subjective map or context to create knowledge (193).

Perhaps the issue of information overload is more a question of quality versus quantity of information. Skeptics such as Theodore Roszak have argued in the book, The Cult of Information, that more information does not necessarily produce better understanding. Roszak indicates that computer enthusiasts quickly become victims to the strategy of data glut and then turn to computers for solutions. He emphasizes that it is not the *quantity* but *quality* of information (Roszack 65).

Data is the resource in the information age. The demand to own data or information for resale and reuse has generated an industry specializing in data-scrubbing, data-mining data-warehousing and data-stores. The irony is that in this data-rich environment, workers are still lacking in understanding and knowledge how to utilize this data for promoting human goals. David Shenk, a media scholar, in his book, Data Smog, recommends reducing the calories of data (information) intake to overcome the "data glut" problem. He emphasizes that we need to shift our information intake with the goal to convert the information we have to knowledge and wisdom. He points out that the

"information gluttony" reduces our ability to critically analyze and differentiate an advertisement from news information. His cure for the evils for the information obesity is "data-fasting" (Shenk 187).

So far organizations have focused on the economic value of information available on the intranet. The more serious challenge before the organizations is how to organize the information on the intranet so that it can be genuinely useful to the employees. Nielson has argued that in a world with information overload, there can be negative costs of information in terms of resources spent reading and pondering it. A steady increase in the amount of information can prevent people from getting the real work done (Nielson 219). Nielson offers the following approaches to resolving the problem with information overload:

- good user interface design
- good editorial preparation of the information
- information retrieval or navigation
- information filtering - user is kept informed by information agents.

Nielson believes that despite automated ways of reducing information overload, the most promising approach will be the one that relies on human judgment (234). On an optimistic note, Goodman thinks that the threat of information overload is only temporary, "before we know filters and agents will help us navigate through the immense information on the internet with relative ease" (Goodman 130).

Roszack, is more skeptical of the claim for increased democracy at workplace with access to information challenges the thinking that "more data will produce better understanding." According to Roszack computer enthusiasts quickly fall victim to the strategy of data glut and then seek to turn to computers for solutions. Roszack argues that there is no solution to be found in mechanized methods of organizing glut. In a vital democracy it not the *quantity* but *quality* of information that matters. Only by changing information into issues and ideas will generate the political discourse needed for the democracy to survive (Roszack 65).

Intranet Usage and Promise of Collaboration

Despite the predictions and enthusiasm of technologists, managers and visionaries that intranets bring about collaborations and cooperation at workplace, this case study indicated that the workers in US WEST primarily use the intranet Web for gathering information rather than collaborating or participating in decision-making. Of the respondents, 61% reported that they never use the Web for collaboration at workplace, and 91% said they never participated in any group discussions. These findings are also supported by the studies performed by Rob Kling of Indiana University who found that the "key to understanding the adoption and usage of intranet application lies in our observation that is it hard to change cooperation and collaboration without affecting control too. Cooperation and control often depend on one another" (Kling 257).

Collaboration and working together are also the new working models that Web-based intranet technologies are promising to deliver. People work in either individual or collaborative modes. The computer-supported cooperative work (CSCW) is a field which

developed in 1980s and became popular as "GroupWare" referring to a shared workspace that supports people working in a collaborative environment using the computer networks and software to organize the groups.

Intranet access can provide the opportunity for electronic collaboration and participation, but to make it happen requires more than technological capability. Kling argues that one of the reason for slow adoption of collaboration and cooperation is because technology is often introduced in organization without clear analysis of how the work process must change for the technology to work (Kling 256).

The results from this survey indicate that intranets and the Web-mediated communications have not yet fostered collaborations. The workers in US WEST have not widely accepted the collaborative models of communications such as participation in discussions groups. This could be because the creating a virtual group for collaboration requires a network of common set of understanding and mutual interests which can lead to a positive online discussion group. According to the comments received from the respondents of the survey, the participation in the discussion groups was limited to intranet Web sites such as "Rumor Mill" and "Friends" where the employees can freely ask questions to the management.

It appears that the workplace culture may not foster the creation of communities of interest where people can hold discussions and participate in a common forum. Additionally, its appears that collaboration can also occur using the e-mail. The e-mail is certainly more popular for online discussions rather than Web-mediated discussions

groups created using Web sites. The e-mail by nature has more capabilities to involve people by setting up address groups. People are used to checking their e-mail system often rather than check the intranet Web site for discussions and message distributions. Early researchers of CSCW expected the electronic discussions to improve decision-making, but according to the studies conducted by Sproull and Kiesler, the democracy and free-flow of information exchange that exists with the electronic interactions actually interfered with decision-making process (Sproull & Kiesler 109).

Information Sharing

Researchers have also suggested that electronic communication using the computer networks create an environment where people are more motivated to give information freely online without being in close interpersonal relationship with the requestor of the information. This hypothesis was tested in a case study conducted at Tandem Computers Inc. (Constant, Sproull & Kiesler 302-322). The Tandem case study revealed that computer networks provide a means for people with weak social ties to seek and provide technical information in a culture that fosters information sharing and considers computer networks to be an organizational resource. In this study, the researchers found that computer networks provide a technical "center" for organizational employees to exchange technical information using weak ties or relationships with acquaintances and strangers. Given a corporate culture that promotes information sharing, computer networks can provide the means for seeking technical advice without the normal face-to-face interactions (Constant *et al.* 303-322).

Intranet fosters information sharing between employees in geographically distributed offices to perform other file-sharing functions. However, as pointed out earlier in this paper, some workplace cultures do not reward human behavior for information sharing which is still considered as an "unnatural act" (Sager 107).

In the open-ended section of the survey, the respondents provided some specific reasons why they were accessing the intranet Web:

- Checking for stock market quotes, sports related issues, comparing prices of products, making travel arrangements, checking weather, university courses, and daily news.
- Searching internal and external directory information e.g., yellow pages, location maps.
- Reading and following newsgroups both work-related and personal issues.
- Browsing the internet for industry-related information or personal information.
- Researching homework for kids and self.

From these responses it appears that users at US WEST, are using the intranets to seek information beyond the needs of their job-related activities. The challenge for management is how to define and limit the scope of what is considered work-related information. If the users are doing research on information not directly related to their current work, it can still be considered part of personal growth and enhancement of career

objectives. Having easy access to information such as weather, stock quotes, travel and yellow pages through the intranets increases the usage of intranets and makes the users more internet savvy rather than if they kept the interaction with the intranet limited to the official uses recommended by the company.

Corporate Polices and Procedures

Faced with some of these threats of electronic communications, US WEST has developed policies and procedures for public internet for personal use, and have issued guidelines for the use of internet advising employees not to use the internet for non-work related activities. They allow usage of public internet for educational, research-based and vendor support type of activities. In addition, US WEST closely monitors and audits the usage of the internet by its employees to see if the policies are being violated. According to the policy of using the public internet, employees are strongly advised NEVER to use the corporate intranet for:

- Revealing information about US WEST operations
- Expressing personal opinions on political, social or other volatile subjects
- Exchanging in hostile, threatening or taunting language to other internet users
- Exchanging language that is racist, sexist or otherwise unacceptable.
- Downloading pornographic or copyrighted material (Online: Tips on Computer Use by US WEST employees 1996)

Personal Interview with the CIO

The results of this study were presented to the Chief Information Officer of US WEST Information Technology to understand the reactions from management on the effects of Web-mediated communication at US WEST workplace. Following is a recording from a personal interview conducted with Dave Laube (CIO of US WEST IT):

> "I am surprised that the Web application usage is not stronger, I believe it will move fairly rapidly into that category as we replace more paper-based forms online for ordering and purchasing office supplies etc. I think the paper-based forms will be completely replaced by the intranet Web-based forms. I have always felt that the intranet was a multi-tiered asset in terms of its usage:
>
> First use of intranet is as a communication tool— as a 'pull' technology, the information is there you can go access it anytime.
>
> Second, I believe it can be used for internal paper substitution, which means changing business processes, getting rid of paper usage, shortening cycle time, and reducing cost by, e.g., ordering supplies on the Web, signing up for United Way on the Web.
>
> Third, I see the use of intranets increasing in the software application itself where you substitute intranet Web-based front end for customized Graphical User Interfaces" (Kolhatkar, M. Personal interview. 17, November 1997).

The corporate vision expressed here indicates that the management still perceives the intranets to provide the first-level productivity or value added gains, the human aspect of

Web-mediated communication is still not part of the agenda for corporations like US WEST.

Web as a Communication Tool

The question before this study was to investigate to what extent the Web was being used as a communication tool. This study suggests that e-mail and intranet communication both play a significant role in organizational communication, and are rapidly becoming the primary forms of communication to a lot of people dispersed geographically. According to the data gathered from this study, e-mail was used almost as frequently as the telephones, 92% of the respondents said they use e-mail frequently, and 89% said they use telephone frequently. The potential of e-mail reducing the delays of "telephone tags" has already been proven in other studies (Sproull & Kiesler 35). Face-to-face meetings were frequently conducted by 45% of the respondents. The use of snail mail or inter-office paper-based communication once a primary form of communication has reduced considerably to only 14% of the users using it frequently. Intranets have delivered the promise of paper distribution costs as online information replaces printed material.

The promise of intranet as speedy, reliable and more efficient communication tool seems to be realized within the corporate world. Communication by one-to-many, and many-to-many and many-to-one such as electronic discussion groups which are popular in the internet world of World Wide Web are still not widely used in US WEST. New developments in the intranet technologies such as Net Meetings or electronic meetings are gaining ground but its usage during the time this survey was conducted was limited.

As the communication technologies of intranets, internets, e-mail, telephones, computers and televisions converge and integrate, the potentials for a rich communication medium evolving seems to be not too far out in the future.

Productivity and Efficiency Gains

The bottom line question asked by most corporate managers investing in the technology is does the intranet and internet make measurable difference in productivity improvements? The productivity gains are hard to measure. This study did not seek to identify productivity issues but to explore more human impacts of the technology on the users of the intranet. Did access to the technology increase user awareness? Was the information available on the intranet useful to the workers job? The responses from the users at US WEST was positive, 85% of the respondents were in agreement that intranets have been useful to their jobs. This indicates that even though productivity may be hard to measure, the worker satisfaction with the technology can have positive impact on the job performance thereby increasing productivity.

The productivity paradox has been studied and discussed by number of researchers and economists, but the findings have only "deepened the mystery." (Brynjolfsson 59). The problem stems from the difficulty of measuring the productivity of "information workers" in the services sector unlike the measurements of labor productivity in goods producing industries in the industrial age. In the information age we have not been able to successfully define and benchmark the productivity gains. Brynjolfsson cautions not to over interpret the results of these findings, "a shortfall of evidence is not necessarily evidence of a shortfall." After reviewing and assessing the

research on the productivity issues, Brynjolfsson concluded that, "it appears that the shortfall of IT productivity is as much due to deficiencies in our measurement and methodological tool kit as to mismanagement by developers and users of IT" (Brynjolfsson 59-65).

Landauer, who studied the usefulness, usability and productivity of computers, also states that, "..everything points to the conclusion that computers have failed to work wonders for productivity. Yet there are exceptions to raise hope that each level of the story: some apparently successful countries, industries, programs" (Landauer 77).

According to a survey conducted in 1995 by Information Week 80% of the managers who responded assume that their subordinates use company-funded online accounts and internet for purposes other than work, at the same time 70% of the respondents also believed that internet improves worker productivity. Mary Hayes who reported the results of this survey in an article "Working Online or Wasting Time" in Information Week stated that, "The internet and commercial online services can help staff work more productively. But frivolous net surfing can waste huge amounts of time, most of it is nearly impossible for managers to monitor" (38).

Technology writer, Clifford Stoll states in his book, Silicon Snake Oil that, "networks bring a flood of both useful and useless information to our desktop. They help me work more efficiently yet still are counter-productive...they are still great for working and goofing off" (96).

Efficiency gains are perceived not in the number of hours worked but the end results of the work done. Managers who focus on results are less concerned with the number of hours of frivolous net surfing but more on the quality of the work done are more successful in working in the networked organizations. As more and more people use the intranets in the workplace, what does it mean for employees and management relationships? What should a manager do when he sees an employee browsing the Web most of the time? As more interactions occur via the intranet Web, corporations will need to develop a new relationship between management and employees, a relationship based upon mutual respect and trust. For trust to work in a networked environment requires a commitment from both employees and management. Fellow of the London Business School, Charles Handy, wrote in an article in the Harvard Business Review:

> If we are to enjoy the efficiencies and other benefits of the virtual organizations, we will have to rediscover how to run organizations based upon trust than control (44).

Frivolous surfing on the net, chatting with other "cybernauts" or browsing through various levels of hypertext libraries can waste large amount of productive time that is hard for the managers to monitor. Corporate managers are beginning to wonder if the World Wide Web "wanderlust" is getting out of hand in the workplaces. Are employees wasting time on the Net?

The reality in offices today is that most employees are busy and overworked, they are at different places at different times, and information is not always where it needs to

be. The promise of intranets is that the employees will become more informed, have access to information at any time, any place and anywhere. In discussing the benefits of e-mail Sproull and Kiesler called the technology as "information accelerator" which allows people to work more effectively than they could do otherwise (Sproull & Kiesler 23).

Bill Gates, in his book, The Road Ahead, states that the computer is just a tool and that the companies need to review their internal processes to support the changing communications environment. "The first rule of any technology used in business is that automation applied to an efficient operation will magnify the efficiency. The second is that automation applied to an inefficient operation will magnify the inefficiency" (Gates 136).

Telecommuting

One of the promises of the intranets is that it allows people to work in a geographically distributed environment, the promise of working "anytime, anywhere, anyplace" provides workers the advantage of working from home or telecommuting. The intranet is instrumental for creating the "Virtual Office" allowing employees at different locations to be connected with each other. Telecommuting takes many forms, as Goodman suggests, "it could mean working from home, from a small satellite office closer to home than the main office, of from a self-contained office in your car or briefcase ..." (Goodman 100).

The question before this study was to explore if access to the intranets from home provided any benefits to the workers or the organization. According to the results of the

survey, it was observed that there is a shift from working in traditional workplace. The respondents are also working from other locations such as home, remote offices and on business trips. Of the respondents 68% said that they access intranet from other locations than their primary place of work, 59% said that they telecommute sometimes, and 46% said that access to intranets facilitates telecommuting. These results are encouraging for US WEST even though 40% of the users said that they never telecommute, as it reflects a shift in the concept of a traditional workplace.

Today, many corporations are putting money in computer networks and intranet technologies that boost efficiency and effectiveness, while reducing the costs of owning real estate properties. The "office of the future" will have no walls and the new paradigm of "work anywhere, anytime" is replacing the "work at home' concept (Hamilton 117). The network connectivity of the workers through the intranets extends beyond the walls of workplace to homes and other remote locations.

Web-mediated communication and computing technologies allow workers the flexibility to work in a geographically dispersed environment. Harasim defines the term "network-place" as the space where people come to perform their work. "Telework is increasingly attractive to companies struggling to reduce overhead, enhance productivity, and attract the best workers ... and to the employees demanding alternatives to the stress of commuting to distant centralize worksites.." (Harasim 20).

Even though the intranets make telecommuting easy, it also creates other problems for the organization such as how to monitor the work of remote employees.

According to Sproull and Kiesler, the reason why telecommuting is still not widely prevalent is because of performance and social control. For clerical work, performance can be measured by monitoring the rate of files transmitted to employer, but for professional work, it is difficult to set benchmarks and measure performance. They indicate that the "stay at homes pose problems of social control for employers" (Sproull & Kiesler 121).

It should be noted that in US WEST there is no official policy on telecommuting, it is entirely dependent upon the decision of the management. According to the CIO of US WEST Information Technologies:

> "...our official position is that it is up to each director group to make its own decisions in this matter. Telecommuting is a complicated issue. Suffice it to say that I believe that a certain type of work lends itself to a work at home environment. This is typically work where the employee spends little time in an office or a stationary desk. Examples of this are sales and customer service jobs. Other types of jobs also work well where it is easy to measure the productivity of the worker. This could be jobs involving telemarketing or other jobs where customer contact can be measured. I don't think that we have any universal answer for the types of jobs typically found in IT. Other IT organizations that have tried to implement significant work at home programs are now pulling them back. So I believe the jury is out. The potential is there, but the practical aspects of the arrangements have yet to be solved" (Online: "Rumor Mill").

This confirms what Sproull and Kiesler have said earlier about the issues of social control. The attributes of intranets that facilitate more open and freer communication can become a drawback for the management. The strategic choices of managing information workers in the "office of the future" will be guided by the policies of control and performance. With a large workforce working in different geographic locations the question arises: how do you manage people you do not see everyday? The question of control & trust inevitably comes up for managers struggling to deal with employees they do not see or interact with daily. The intranet creates a shift in the control of information power (Sproull & Kiesler 121).

Security and Privacy Issues

Although, this study did not explore the issues of security and privacy with the Web-mediated communications, a review of the current literature suggests that the Web poses threats to the workers and the organizations. At the time of this study was conducted, the threats associated with privacy and worker monitoring were not prevalent concerns. In the open ended-section of the survey, users did not identify privacy to be an issue at all. However, the issues of privacy and monitoring at workplace are discussed from a perspective of literature review.

Along with the promise of a networked office, the Web also creates security issues for individual workers and the organizations. For the organizations trying to be competitive, the task of keeping the proprietary information from reaching the hands of competition, and preventing computer viruses to attack the internal information system, becomes a real challenge. As the Web has opened the doors to public networks,

Companies are trying to safeguard their proprietary information and make their networks more secure by building extensive firewalls of protection on the Internet. "Firewalls" and "security gates" block unwanted traffic from penetrating the corporate walls. US WEST has defined "Codes of Business Ethics and Conducts," and "Information Asset Protection Policies" specifying how Proprietary and Confidential information must not be transmitted via the internet. US WEST protects the information resources via firewalls, user authentication, and security gates. On the individual level, the implications of privacy threats on the intranet Web are just beginning to be realized.

Companies have adopted software devices to audit, control and monitor employees and how they use the Internet. Since the internet has also become a medium for distributing offensive and pornographic materials, organizations are facing the dilemma of drawing lines between legal and illegal distribution of adult material, absolving themselves from any legal repercussions and making the employees responsible for their actions on the internet. Laws in this area are crossing boundaries between criminal acts, freedom of expression and commercial interests. People who use the on-line forums on the internet are already trying to moderate what gets said on the internet, however the message content and the source of the information can be anonymous making accountability difficult.

Monitoring at Workplace

Corporate e-mail, which is one of the most popular and relevant networking technologies, poses the biggest potential breach of privacy to workers. Corporate electronic communications are subject to snooping by those who have access to the

corporate computer systems. While trying to diffuse some of the myths surrounding the growth of the 'Information Highway,' technology writer Danny Goodman also acknowledges the darker side of technology in his book, Living at Light Speed. He recognizes the threat to individual privacy in electronic communications when corporations use e-mail archives to investigate conducts of improper behavior by the employees. The laws protecting employee communications are currently in the favor of employers. It is considered fair game to snoop on employee e-mail s as long as the employees are made aware of the policies. Goodman warns that until these laws change in the favor of protecting privacy in the electronic communications, employees should not expect privacy in their communications (165).

According to a report titled, "Technological Surveillance in the Workplace," published on the Internet by Brent T. Johnson, there has been a growing trend among employers to monitor the usage of electronic communications of the workers. The concern stems from the potential abuse of the Web technology and misuse of company property for personal reasons. The federal and Colorado laws on technological surveillance of employees are covered under the statutes of "wiretap" and "electronic communications" (Johnson 1995). The "wiretap" statute prohibits the interception of communication while in transit, but allows monitoring of and accessing the stored communication if the policies of access are published. Therefore, a cautious organization simply has to publish a policy informing the employees that the company reserves the right to access and monitor all e-mail messages stored in its computer systems. Johnson further notes that a bill called the "Privacy for Consumers and Workers Act" has been

stalled in Congress since 1993. In the absence of a well-defined privacy law, the danger lies more with the abuse of confidential information in the wrong hands and the risk of false distribution of information.

Other types of worker monitoring occur in computer tracking systems which capture the number of keystrokes or errors made by the employees, or the number of customer service calls handled by the employees. Though both law and technologies allow certain types of monitoring activities by employers, the question of importance is what is to be gained with this type of monitoring? This type of monitoring could lead to more counterproductive employee behaviors (e.g., low morale, increased job stress and low productivity). It is clear that the issue of monitoring at workplace has many perspectives and challenges. From management perspective, the dilemma is how to measure productivity in the information age, tracking misuse of electronic communications. From the employee standpoint, electronic monitoring could infringe upon individual privacy rights.

What is relevant here maybe the question of why monitoring is necessary at all? Maybe the employers need to re-evaluate the old ways of measuring worker productivity by monitoring the amount of goods produced, to a more information and knowledge-gained performance in the information age. The new technologies demand a cultural change in measuring performance, a culture that creates a climate of trust where the workers can self-motivate themselves to work and thereby reduce the management anxiety to keep tabs on the workers.

The research discussed here suggests that the worker's privacy in the age of information is not protected any more than during the industrial age. The monitoring is more subtle and invisible, but more insidious where the workers are not even aware they are being monitored.

Managing Content

Information is a perishable commodity like fruits and vegetables: what is of importance today may be obsolete tomorrow. Having access to the most current and updated information becomes critical for corporations. Intranet Web allows the employees to seek the information they want it, when they want and at relatively little cost for the company. The employees can seek access in the libraries across the world to get information on solving a technical issue at work, or post a query on the Internet to see how other people have solved a similar problem.

The intranet Web makes it easy for users to view and retrieve information, but the corporations are rapidly realizing that without an efficient process and infrastructure of creating and managing the information they cannot harness the benefits of the technology. Intranets are providing the medium of distributing information instantaneously thus raising user expectations on getting the most current information immediately. One of the challenge before this study was to investigate if the intranets provide the latest information that people need and what kind of issues arise in keeping this information up-to-date and current. This survey result indicated that the most frequent problem encountered by the users was outdated content or information. The

accuracy of the information is compromised when the content is no longer reliable or is outdated. Some of the user comments were as follows:

- "Little too much emphasis on cute vs. content"
- "I hate it when no one is assigned to update the information and the pages are outdated."
- "Departments establish Web sites in an attempt to have a 'visual' presence on the intranet, but don't keep it current."
- "The biggest problem is outdated information, people are creating Web pages at a very rapid pace but they become quickly out of date and useless. There should be some accountability for keeping Web pages current." (1997 USWEST Intranet Survey).

These comments suggest that the intranet in US WEST grew out of grassroots efforts without a strategy for maintaining and reviewing information for accuracy. The lesson here for the organization is to create policy for maintaining and updating the information. The role of "Webmasters" is a new function in the Web-mediated organization. This new job responsibility was not defined before the intranets proliferated, it requires maintenance and updates of the information distributed via the Web to be monitored and controlled. Corporations that joined the intranet bandwagon quickly realized that just setting up the intranets was not enough, maintaining its content and keeping the corporate information up-to-date is a bigger challenge.

Loss of Human Interactions

At the time this study was conducted, the 68% of the respondents indicated that they did not experience loss of human interaction with other people since they have been using the intranet Web as a communication medium. These results confirms what other technology theorists have stated that computer networking does not replace other forms of human communication, it increases our range of human connectivity and the number of ways in which we are able to make contact with others (Harasim 16).

The intranet users in US WEST did not seem to think that they were losing touch with their colleagues. The intranet appears to be enhancing their human interaction that occurs in face-to-face relationships. Overall the users at US WEST consider that intranets have had a positive effect on their workplace. But it may be too early to judge the full implications of the technology.

Contrary to these findings, other researchers have indicated the long-term impacts of the interacting solely through computer-mediated communications. In their book, The Network Nation, Starr Roxanne Hiltz and Murray Turoff raise important human issues when discussing the societal impacts when people use computer networks to facilitate human communications:

> Those who work through their terminals may emerge as a new class, sharing the condition of being physically invisible to others. Will some forms of work relegate these 'information workers to the role of cognitive cogs in the 'information machine?(142).

Professionals in the field of psychiatry are also beginning to see a toll being taken on workers. Prof. Edward Hallowell of Harvard Medical School, who has studied the effects of social alienation in the workplace, points out that the deprivation of the "human moment" at the workplace can create a number of problems in the organization (Hallowell 58-66). Hallowell's study indicates that alienation in the workplace can lead to mental health issues creating distrust and dissatisfaction on the job. While studying the brain chemistry of the "human moment" he points out that human contact is essential for true communication. The dangers of the disappearing "human moment" increase when the employees and their managers solely interact by e-mail , or voice-mails. During the rare instances when employees and employers interact, it is difficult to discuss complex issues. This can continue to smolder causing distrust and dissatisfaction at work. In order to preserve the human moment, Hallowell suggests augmenting the electronic communication with face-to-face meetings (66).

In discussing the societal dimensions of technology, Meeks has pointed out that technology is never a substitute for human interaction or ever will be in the future. (Meeks.76).

"Perhaps the most profound change brought about by corporate intranets will be social not technological. Intranet technology has given us new tool to command political influence that changes the organization as whole, " says Sherman Woo, US WEST Director of Information Tools and Technologies. "The technology is trivial; the hard part is community" (Information Week, Jan 29, 1996, 78)

Like all technologies, the intranets also impacts our work ethics and humanity. The challenge lies in how to harness the technical power of the Web to support our human needs as well. As we interact more and more via the intranets with our colleagues in the virtual offices what affect will it have on our human need for personal contact? Will the intranets isolate and alienate us from our co-workers or will it bring us closer? Direct human contact may become infrequent in the virtual world. What impact will that have on our human psyche?

Being connected also means that employees can take the work everywhere they go. Voice mails, pagers, cell phones, internet, telephone and videoconferences - all these technologies can connect us wherever we go. It is getting harder not to be in all places at the same time. What impact does this have on our leisure activities, and our personal lives? People are working longer hours and work-related tasks are sneaking into our leisure - with the mobility and flexibility of internet comes the demand to extend work beyond 40-hour week. The expectation for an employee to work overtime is becoming a norm with office workers today. These issues need to be explored further by additional field studies and research.

Increased Task Complexities and Loss of Expertise

Unlike in the industrial age, when the quantity of the manufactured goods was used to measure the output of the assembly line workers, in the information age the output of modern knowledge workers is difficult to measure. The intangible knowledge-base products create more task complexity. Technology author Stephan Roach, points out in his article in Wired magazine, that task complexities have increased with the rapid

growth of computing power. Roach points out that the mounting task complexities demands workers to work longer hours, and encourages the use of portable technologies that make working offline mandatory (69). Being connected at all times has become the attribute of the information age worker. The extension of working time is eroding the leisure time previously enjoyed by the workers.

Dertouzos, on the other hand, believes that the increased complexities in our world today is due to poorly designed products which are not easy to use. According to Dertuozos, the purpose of technology is to make new artifacts fulfill the needs of humans; not to make their lives more complicated (297).

One of the impacts of new technologies at the workplace is the growing demand for new skills. The pace of technological change requires a resource pool for highly skilled workers to respond to changing market forces. This raises concerns about job security, job displacement, skill obsolescence and the future of the traditional manual jobs. To overcome the skill gaps workers have to constantly update their skills, yet they feel inadequate no matter how much they learn. The constant state of learning is enough to create a level of techno-stress on the workers.

In his book Trapped in the Net, Gene Rochlin gives us examples from different fields where the loss of expertise occurs when skilled workers are spending most of their time nurturing the complex "computerized systems instead of actually running the plant" (69). He cautions us that the gradual movement of computerization into the workplace can cause the "dumbed down" workers and decentralized control.

The question of importance here maybe to explore what the corporations are doing to assist the workers in preparing themselves for the challenges of the information age? If these workers are the knowledge experts who need to constantly retrain themselves, the companies should be investing in these information resources. In a recent article published in the Business Week, a 1999 study conducted by Emerging Workforce indicates that 41% of employees polled said that they would leave the company within a year because of poor training opportunities. The study recommends that corporate culture needs to change to provide mentoring and training to employees for high technology jobs (Reingold 8).

Despite the proliferation of the intranets at workplaces, most of us are still preoccupied in "getting connected," becoming "Web-literate", "HTML-literate", and setting up our "Home Pages." Computer literacy is an acquired skill set, the new demand is for the network-literate people. In our obsession for becoming knowledgeable about network connections and intranet technology, we tend to lose the big picture - an understanding of what impact this technology is having on their lives. According to William Gardiner, author of the book, The Ubiquitous Chip:

> The ubiquitous is paradoxically elusive. A close look is not necessarily a clear look. The fish will be the last to discover water. However, since technology is the 'water' in which we are bathing and since it is seeping into our every pore, it is imperative that we understand its influence upon us (Gardiner 83).

Chapter VI: Summary and Future Direction

The ultimate vision of ubiquitous networking will be to effortlessly retrieve the information you need when you need it, or to send a message (text, audio or video) to who ever you want to send. Instead of the information chant we hear from the intranet proponents today: "anything, anytime, anywhere," Nicholas Negroponte founder of the MIT Media lab wants his mantra to be: "nothing, never, nowhere - unless it is important" (Negroponte 201). The findings of this study indicate that we are just beginning to recognize and understand the issues raised by the usage of the Web technologies at the workplace.

This study provides trend analysis as to how the intranet Web-mediated communication is evolving within a corporation. Ultimately, it is the people using the technological tools who will determine how our communication patterns will change. "The outcome remains uncertain. What the Net will become is still, in large part up to us" (Rheingold 310).

The true challenges of the Web-mediated communication technologies in the workplaces lies in the understanding of how people use the network for communication and information exchange than from moving large amounts of information rapidly from one place to another. The effect of the electronic network of Web-mediated communication technologies on workplaces be dependent upon how the network is managed by the social processes and polices of the designers and managers. According to leading futurists of technology, the "most pressing question for the future of internet is

not how the technology will change, but how the process of change and evolution will be manage" (Cerf *et al.* 102).

Future Direction

The Web provides many opportunities for corporations to enhance communications, introduce collaboration, develop interactive applications, but these potentials can only be realized if the organization leaders have the vision and are able to implement policies to carry out the visions successfully. The organizational culture needs to change to accommodate the changes in the communication process and create an atmosphere where employees are encouraged to share and give information freely. Sproull and Kiesler have come to the conclusion that, "computer-based communications allows people to work somewhat more efficiently, but the realized benefits depend ultimately on the policies of people who want to organize work in new ways" (175).

Survival Strategies

The views presented in this paper by experts and futurists indicate that although we have legitimate reasons to be concerned about the human impacts of networking technologies, there may also be good reasons to hope for a better future. The real challenges lie in what can be done to overcome and manage these changes.

The transition from the industrial workplace to the networked workplace of the information age requires people to be vigilant of the pitfalls and seek ways to overcome them. The following survival strategies are action plans proposed by some of the futurists on surviving the information age.

Preserving the Human Contact - Avoiding Workplace Alienation

As discussed earlier, we know that the networked workplace threatens the human interactions and face-to-face interactions that are key to human survival. Human elements such as visual cues, facial expressions, body language necessary for human interactions are lost in electronic communications. In his agenda for the business community, Dertouzos recommends supplementing electronic communications with face-to-face meetings to build a trusting relationship (329). The network communication can enhance the sphere of human interactions if people can make a conscious decision to reinforce the electronic interactions with face-to-face meetings to build the trust factor needed for teamwork within an organization.

Staying Vigilant to Monitoring and Privacy Violations

Since networked workplaces also provide employers new ways to monitor their employees and ensure they are doing their jobs, the workers also need to guard against when the monitoring becomes an invasion of their privacy.

To overcome the management dilemma of monitoring employee performance requires a change in the management culture by building an environment of trust and motivating employees to perform. Sproull and Kiesler studies indicate that organizations are trying to implement policies, and training programs to manage behavioral changes in workers when they are working remotely and internalize the sense of commitment for their work. Their studies suggest that monitoring may not be necessary if the measurement of worker performance is promoted through building the trust and commitment for work (117).

To prevent invasive monitoring, the employees can guard themselves by questioning unnecessary disclosure of personal information. Being conscious of divulging sensitive information becomes the responsibility of the individual worker. To prevent potential misuse of sensitive information, we need to question its use before divulging the information. Dertouzos recommends that staying vigilant about privacy, authentication, security or lack of it is imperative in today's information age (321).

According to Johnson, if the employer wrongfully discloses personal information on employee's private or confidential information such as medical records, to anyone, thereby causing harm to the employee, they could liable under the Common law of Invasion of Privacy (Johnson 9).

Creating Humane Designs

One way to manage task complexity of the information age is to create humane solutions rather than technological solutions. Donald Norman champions the need to develop "appropriate" technologies that are based upon human needs. His proposal for making technology humane is to create people-centered designs of machines that affect our day-to-day lives (250).

According to Mark Weiser, a scientist who is involved in the creation of future computers, the most profound technologies are those that disappear, meaning they get so enmeshed in the fabric of our lives that they are indistinguishable from it (Weiser 78). Weiser's vision of ubiquitous computing is when the computers reside in the human world and pose no barriers to personal interactions. He thinks that the ubiquitous computing will mean the decline of the computer addict and will be as relaxing as taking

a walk in the woods. Ubiquitous computing will arrive when the machines fit into the human environment instead of forcing human to enters theirs (89).

Overcoming the Information Overload

In his book "Data Smog", David Shenk proposes a more drastic manifesto for surviving the information age. According to Shenk's assessment information overload "threatens our ability to educate ourselves, and leaves us more vulnerable as consumers and less cohesive as a society" (15). Some of Shenk's proposed strategies are:

- **Become your own filter**. Shenk states that we need to become selective of what we read or watch or hear. This means we have to become discriminating consumers of information. He recommends leaving pagers and cell-phones behind at times, and limiting the amount of e-mail we read. Another strategy is to cancel subscription from unwanted newsgroups on the net or filtering the unwanted e-mails or junk mail to be sent directly to your computer trash (185-186).
- **Simplify lives**: Shenk suggests we should embrace a new paradigm of simplicity by forsaking complex technologies in our lives and adopting the ones that can get our job done. He recommends we should start asserting our dominance over technology by finding meaning and purpose with the technology (197-199).

Maintaining humanistic perspective

Paul Gilster, the author of the book Digital Literacy, states that one of the "core competencies for surviving the information age is to retain the human ability for judgment and critical thinking." He defines the concept of digital literacy to mean more

than just being able to read the information on the Internet, but to comprehend and make informed judgments about what we discover from the different resources on the Web (2). The networked workplace demands that the workers become discriminating consumers of information. Retaining the ability to think critically becomes one of the core competencies of the information age.

The lesson learnt from this humanistic perspective is a humbling one. The important surviving strategy is to maintain a balance between recognizing human strengths and human weaknesses while adjusting to new technological changes. We need to recognize that while technology can solve some of our old problems, we humans can also create new problems in the process of using the new technology. As John Perry Barlow, the Founder of Electronic Frontier Foundation, explains in his essay on The Best of All Possible Worlds, that our quest should not be for creating a perfect world but more for celebrating the human ability for "hope" (Barlow 74).

Conclusion

This study provides a glimpse of the networked organization of the future is evolving, it provides some trends on how the Web-mediated communication is affecting the workplace at US WEST. The focus of organizational research on Web-mediated communication needs to further analyze the long-term consequences of using the Web as the primary medium of communication at workplace. A look at longitudinal studies in corporations will provide us a better trend analysis of how the Web- mediated communication technology is affecting the modern workplace.

The key issue may not be the potentials of the new technology, but how people use the technology in the context of the workplace. The message for management here is to create an environment of cultural change that fosters the transition of employees into the information age. Organizations would need to facilitate the culture of information sharing and building the trust of the employee. The agenda for the worker is to retain the critical analysis skill for making informed decisions.

The compelling arguments provided by scholars and researchers on the humanistic consequences of the information technologies make it evident that workers and employers in the information age will have to stay vigilant to the uses and abuses of the technologies. It raises human consciousness and awareness that to survive in the networked workplace, the workers and the management will have to review new technologies and their applications with a humanistic perspective, and maintain their ability for critical analysis.

Finally, as we move into the 21st century, author John Verity reminds us what the computer scientist Joseph Weizenbaum said two decades ago in his book: Computer Power and Human Reason:

> We must learn the limitations of our tools as well as their power. Even in the most advanced state, the computer is not and never can be a panacea for human problems or a substitute for our unique human judgment (Verity 18).

Appendix

Intranet Survey Questionnaire

1997 Intranet Usage Survey

US WEST's corporate intranet Web sites like "Global Village" have become a popular means of sharing information and communicating with the employees. The success stories that intranets reduce costs and provide competitive advantages are well known. What is not clear is how the employees use the intranet Web services, and what impact it has on the human communication at workplace.

This survey is being conducted to study the intranet Web as a medium of communication at work. US WEST will use the results to improve the intranet services. It will take you less than 10 minutes to complete this survey. Your individual responses will be kept confidential.

About You

You are an: Employee Leased worker (contractor)

Your position: Occupational Management

Your organization:

Your internet experience:

Your Intranet Usage

1. Which Web browser do you usually use at work?(Choose one)

- Netscape Navigator
- Internet Explorer
- Other (Please specify other)

2. Which E-mail service do you usually use at work?(Choose one)

- Netscape's Netmail
- Lotus Notes
- cc: Mail
- Other (Please specify other)

3. How long have you been using the US WEST intranet Web sites?(Choose one)

- Less than 6 months
- 6 months to 1 year
- 1 year to 2 years
- 2 years & more

4. On average, how often do you visit the US WEST intranet Web sites to perform a certain task? (Choose one)

- Once a month
- Once a week
- A few times a week
- 1 to 4 times/day
- 5 to 8 times/day
- 9 times/day or more

5. On an average day, how often do you check your E-mail ? (Choose one)

- Once a day
- Twice a day
- Every 2 hours
- Every hour
- A few times an hour
- Every 15 minutes or more

6. From which of the following locations do you access the US WEST intranet? (Check ALL that apply)

- Primary work location
- Secondary work location
- Home
- On business trips(e.g. Hotels, Conferences)

7. How often do you telecommute (i.e. work from home)?(Choose one)

- Never
- Once a month
- Few times a month
- Once a week
- More than once a week

8. Does access to US WEST intranet facilitate your decision to telecommute?(Choose one)

- Yes
- No
- Does not apply

9. How often do you perform the following activities using the US WEST intranet Web? (Choose one for each of the bulleted items)

	Never	Sometimes	Frequently
Browse intranet Web sites			
Search for information			
Provide information e.g., feedback forms			
Use E-mail service			
Participate in online discussions groups			
Download files, software etc.			
Obtain training			
Use Web applications e.g., pay phone bills			
Publish information e.g., design, manage Web sites			
Collaborate online, e.g., project tracking			
Surf external Web sites			
Other activities			
Please specify other			

10. How often do you use the following tools to communicate at work? (Choose one for each of the bulleted items)

- Intranet Web sites
- Video-conference
- E-mail
- Voice mail
- Fax
- Pagers
- Telephone (wired)
- Wireless/cellular phone

- Inter-office mail (paper)
- Face-to-face meeting
- Other
- Please specify other

11. How often do you experience the following problems with the US WEST intranet? (Choose one for each of the bulleted items)

	Never	Sometimes	Frequently
It takes too long to find the information you need			
It takes too long to view/download pages			
Not finding the information you need			
Information you find is not what you expected			
Information is not updated			
Feeling lost or not knowing where you are			
Links are broken			
Other problems (Please specify)			

12. **Impact of intranet Web**

Please read the following statements and check one for each response:

- Overall, I find the US WEST intranet Web sites easy to use.

  —strongly —disagree —disagree —neutral —agree —strongly agree

- I find getting access to company information is easier since the intranet.

  —strongly —disagree —disagree —neutral —agree —strongly agree

- My awareness of company news and events has increased since the intranet access.

  —strongly —disagree —disagree —neutral —agree —strongly agree

- The information I find on the US WEST intranet Web sites is useful to my job.

  —strongly —disagree —disagree —neutral —agree —strongly agree

- With intranet access, I am able to communicate with people I would not meet face-to-face.

  ---strongly ---disagree ---disagree ---neutral ---agree ---strongly agree

- I feel a loss of personal contact with my colleagues because of the intranet access.

  ---strongly ---disagree ---disagree ---neutral ---agree ---strongly agree

Thank you for your participation!

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