Computer-Mediated Communications in the Organization: Using Electronic Mail at Xerox

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In the last several decades, technological innovations in computers and telecommunications have created a wide array of new communication media. For organizations, these new media represent opportunities to overcome communications problems resulting from a geographically dispersed workforce, and to enhance the productivity of organization members. Media such as teleconferencing and electronic mail provide new communication capabilities to help improve the flow of information, and to facilitate the coordination of action when people are not in the same location.

It is important for organizational communication experts to recognize, however, that successful implementation of new communication technologies in organizations is not guaranteed. Some very expensive systems have been installed in settings where the hardware is rarely or never used. Moreover, utilized systems have had unanticipated consequences—some desirable, others perhaps less desirable. It is not possible to predict all outcomes of implementing a new means of communicating. Case studies of what happens after new media are implemented can help to expand our awareness of the range of possible uses and effects, as well as arm future planners with a broader understanding of the ways in which people adapt technological systems for purposes beyond those envisioned by system designers. Many of the unique ways in which one new communication technology, electronic mail, can be used in an organization is illustrated in the case of the Xerox Corporation. What follows is a brief overview of electronic mail, before moving to a detailed description of its use and impact at Xerox.

ELECTRONIC MAIL

Electronic mail has been called the cornerstone of the office of the future. It is, however, an integral part of the office of today. Of all the new communication media available, electronic mail has perhaps achieved the most widespread acceptance in all types of organizations, including businesses, government agencies, and universities. There are literally millions of electronic mailboxes, and although most are on intracompany systems, there is a growing effort to interconnect separate computer networks to enable intercompany electronic mail communication.

At its simplest level, electronic mail provides the capability to create a textual message on a computer, transmit it to one or more recipients, and store the message in receivers' "electronic mailboxes" for subsequent display when they next use their computer. Most systems provide a powerful array of features to facilitate the process of message creation, storage and processing, transmission, and reception. Such features include the ability to store lists of destination addresses, so that the same message can be delivered simultaneously to large numbers of receivers; automatic reply capabilities; electronic filing, searching, and retrieval functions for processing received messages; and many others.

Motivations to install electronic mail systems originally focused on the productivity improvements that could be gained among managerial and professional staffs. Many behavioral studies of managers and professionals concluded that a large proportion (up to 70 or 80%) of the workday was spent in communication-related activities such as face-to-face meetings, telephone calls, reading, and writing. Thus, improving productivity in these kinds of workers was felt to require investment in technology that could support and enhance the communication process. Further analysis demonstrated that there were many unproductive behavioral activities associated with typical managerial and professional communication. Called "shadow functions," these activities individually accounted for negligible amounts of wasted time, but in the aggregate could account for as much as 30 minutes to an hour of every workday by some estimates. Examples of shadow functions are the time spent dialing a busy telephone number or calling someone who is not in their office. Searching for a telephone number or mailing address are also shadow functions. The time spent collecting one's thoughts after a telephone call or face-to-face interruption represents yet another type of shadow function.
As pressures to improve office productivity grow, the benefits of an asynchronous, computer-enhanced medium like electronic mail become the subject of much attention. With electronic mail, many shadow functions can be eliminated. There is no searching for a telephone number or address; to mail information only a user's identification name or number is needed, and this can be kept in an electronically searchable directory. Moreover, "telephone tag" is avoided, if individuals can send and receive messages at their convenience, rather than when busy schedules intersect. Electronic mail is not intrusive—messages do not demand to be "opened" immediately like a ringing telephone demands to be answered—and so interruptions of trains of thought can be avoided. Messages are delivered rapidly, eliminating the delay of paper mail.

On the other hand, the standard lore we obtain from the literature is that electronic mail communication does not provide the same richness as a face-to-face conversation, or even a telephone call. Because of the limited amount of nonverbal information transmitted, and the delay in feedback, electronic mail has been considered to be low in a quality known as "social presence." This implies that users may not feel that receivers of messages are socially and psychologically "present" at the time of communication, and therefore will rely on this medium for "interpersonally involving" types of tasks. In a similar vein, electronic mail has been characterized as being low in information richness, implying that it is not an appropriate medium when the information to be conveyed is ambiguous and subject to multiple interpretations. Because of the lack of added information supplied by nonverbal cues, and the limited ability to head off any misinterpretation without immediate feedback, most researchers feel that electronic mail is more appropriate for simple and routine exchanges. For more ambiguous and complex messages, the potential for misinterpretation is high.

This brief description illustrates the standard view of electronic mail as a simple text-based communication system enabling quick delivery of brief messages, in lieu of making a telephone call or writing a memo. Such descriptions, however, lead to an underestimation of the range of applications and effects of organizational communication patterns when provided in the absence of any specific organizational context. In fact, there is growing evidence from field research that computer-mediated communications are used in ways that have not been anticipated by the literature. Not only are there individual differences in people's willingness to apply electronic mail for various purposes, but each organizational setting appears to have different norms, policies, and cultures regarding electronic mail use. We turn now to a case study of the use of electronic mail at the Xerox Corporation in order to illustrate the enormous potential of this new communication technology to enable patterns of communication that would be unimaginable as few as 20 years ago. Where possible, we draw connections to choices made by the company that appear to have facilitated the evolution of a rich electronic communication environment.

THE XEROX CORPORATION: A BRIEF HISTORY

For most people, the name Xerox is synonymous with the ubiquitous photocopier machine; in fact, the company name itself has come into standard usage to refer to the process of photocopying. The company's principal product is credited with changing the way the world engages in business. The company enjoyed phenomenal success, dominating the photocopier market for many years throughout the 1950s and 1960s.

Times have changed in the photocopier business. Competitive pressure, from other copier companies as well as from competing technologies, has forced Xerox to concentrate on its core business, and to conduct research and development aggressively in order to stay on the leading edge of information technology. Moreover, Xerox has grown to include sites spanning the globe, with headquarters in Stamford, Connecticut; research facilities in Palo Alto, California, and Webster, New York; training facilities in Leesburg, Virginia; manufacturing facilities throughout California and several other states; marketing offices in Dallas, sales offices worldwide; and subsidiaries and affiliated companies in several countries, including Germany, the United Kingdom, and Japan. In the face of competition, effective communication and information flow can be a critical resource, yet difficult to accomplish with such a geographically dispersed workforce.

ELECTRONIC MAIL AT XEROX

Xerox has a highly evolved electronic mail system, which has been in place for approximately 15 years. The original system spread from the Palo Alto Research Center (known as Xerox PARC) throughout the company and its affiliated organizations. Today there are an estimated 20,000 work stations connected to the Xerox Internet, a global private telecommunications network linking Xerox-affiliated companies in the United States, Canada, Europe, the South Pacific, and Japan.

The Xerox system couples an easy to use interface with extraordinary technical capabilities. The system in use is a result of research by computer scientists, cognitive psychologists, human factors researchers, and other specialists at Xerox PARC. The mail system is actually an integral component of a full-featured office information system. Thus, users can create
and mail any size, type, and number of documents, including graphics, using a Xerox work station product (called a Xerox 6085).

The system supports the easy creation and maintenance of large public and private distribution lists. A distribution list is simply a file containing the system identification addresses of a group of users. Messages that are addressed to the list name are then automatically distributed to each user on the list. Thus, the same message could be mailed to hundreds, or even thousands, of employees without having to know or type their system addresses, as long as they are on a distribution list. At Xerox, there are literally hundreds of public lists, and part of the system software enables users easily to place their name on public lists oriented to some topic of interest.

There are essentially three types of distribution lists (DLs) in the company: (1) Organization DLs are lists of all users in a particular work unit, department, or division and are useful for disseminating administrative information. (2) Work-related DLs are lists of people who share a common job function, work on a common project, or share an interest in some topic of relevance to their work. (3) Finally, social DLs are lists of people who share a common interest in topics that are unrelated to work. They may share common hobbies or recreational interests, or simply share a desire to engage in entertaining social interaction with others in the company.

Perhaps the most critical key to Xerox’s success with electronic mail was the company’s decision not to restrict usage of the system by employees in any way. Employees do not pay to use the system, and are encouraged to use it for any and all communications with other people at Xerox. Uses for social purposes are not frowned upon, unlike with many electronic mail installations in other companies. The original name, “Grapevine,” of the internal computer network over which electronic messages were transmitted illustrates the view in this company of electronic mail as a tool for informal horizontal communications.

In 1982, a study of electronic mail uses and effects was conducted at Xerox. Interviews with system users, observations of system use, and a detailed survey of a random sample of several hundred users provided a rich data set for this case study. In the following sections, we describe several observations from this research about the use and impact of electronic mail at Xerox, including, where possible, descriptions of specific incidents that highlight the unique communication capabilities afforded by this new medium.

By the time of the study, the electronic mail system was an integral part of the typical user’s workday. People reported spending an average of over 40 minutes each day processing mail. Although survey respondents only reported sending an average of a couple of messages every day, because of the distribution lists, people received many more. Several of the heavier users reported typically having 50–100 messages waiting in their electronic “in-basket” each morning, although for most the number was far smaller (approximately 5–10 messages per day).

Most electronic mail was intended for one-on-one task-related communication. Typical uses included asking for and providing information, scheduling meetings, brainstorming ideas, forwarding messages to appropriate destinations, providing feedback on reports, sending messages in place of a phone call, and keeping a record of agreements. On a social level, the system was also used to keep in touch with people in other locations. However, because of the DLs, many additional uses were described by users. The system enabled frequent group interaction, allowing use of the system for broadcasting information requests, keeping track of company happenings, and coordinating project activities. DLs were also used for social purposes, including organizing social activities, participating in entertaining conversations or cross-locational games, and advertising items for sale. These “broadcasting” applications of the electronic mail system represent relatively new communication capabilities for organizational participants. Below, some of the implications of broadcasting on electronic mail are discussed.

Distribution Lists and the Flow of Information at Xerox—
Accessing Remote Expertise

One of the clear task-related benefits of the system is increased access to information. Telecommunications technologies are often touted for their ability to link people to remote sources of expertise. In a large organization with in-house research-and-development centers, there is a large pool of technical knowledge that is potentially available to employees, if only a means can be found of linking those in need to appropriate sources of information. Through the use of public distribution lists on the Xerox electronic mail system, such a means exists. One use of the system identified in the study was broadcasting requests for information to other parts of the organization. Theoretically, only those with the desired information will respond, while everyone else will simply delete the message.

An example of this type of use occurred during observation of the system. At the time, Xerox was working on a personal computer product known as the Xerox 820. Although most of the research-and-development and manufacturing divisions were in California or the Rochester, New York area, a small team of Xerox 820 designers working on the display features of the computer were located in Dallas. They felt isolated from the bulk of the technical expertise in the company, since the Dallas office was comprised primarily of marketing and sales staff. This group was having difficulty deciding on which of two display options to use for the 820. Using several organizational DLs, as well as a DL called the 820 Interest Group, they
members of distribution lists are quick to correct someone for sending a message with inappropriate content to their list. A "catchall" list called "junkmail" was created for messages that did not belong on more specific DLs. Users can voluntarily place their names on the junkmail list, but recognize that many of the messages addressed to this list will be irrelevant.

Often the system is used not only to inform employees of appropriate norms for behavior, but also to discuss the norms openly and articulate contingencies for violating norms. In one set of exchanges, a user criticized someone for using the network to print 75 copies of a four-page document, causing him and several others to have to wait a considerable period to get their single copies of one- or two-page documents. This angry user not only addressed his message to the "culprit," but also carbon copied the message to the printing system DL and to the junkmail DL. The message pointed out that copy machines should be used for multiple copies, while printers should be used to obtain a single original. The original message was quickly followed by messages that suggested he not react so angrily, because in some situations others felt the need to print multiple copies. Over the next few days, the policy was reconfirmed, but a variety of situations were defined in which printing multiple copies on a print server might be acceptable. Thus, the electronic mail system served as a tool to facilitate both the transmission and evolution of norms and policies, encouraging public debate.

Supporting Cross-Locational Project Teams

Xerox, like many other corporations, often assigns people to work on project teams outside of their normal work unit. Many research-and-development projects require input from people from diverse disciplines and job functions, and are of limited duration. The appropriate people are not always colocated, and, hence, the electronic mail system becomes an invaluable tool for coordinating project activities. The conducting of the electronic mail study reported here, for example, included several people from El Segundo, and several from Palo Alto. The mail system enabled the exchange of drafts of questionnaires, scheduling of interviews, discussion of ideas, status reports, and other activities essential to the study. In this fashion, input from the necessary people was obtained without disrupting their regular work unit activities. Travel was kept to a minimum, and only occurred after all the preparatory work was completed.

Socioemotional Uses of Electronic Mail

As noted above, there are few restrictions on use of the electronic mail system. Upper management leaves it to the employees to police their use.

Communicating Policies and Norms for Behavior

One of the more interesting uses of the system is to articulate appropriate norms of behavior at work. Often these norms are in regard to appropriate communication activities on the electronic mail system. For example,
As a result, social uses of the system are as much a part of the electronic mail landscape as task uses. Many DLs are geared toward specific hobbies, or recreational activities, and it is not uncommon for employees to organize social activities over the system. For example, during the system observation, a white-water rafting trip for Xerox employees was organized. People were notified about the trip, and could reserve a space over the system. DLs are available to discuss the merits of particular restaurants, movies, and books. At Xerox PARC, one person made a habit of reading the I Ching every morning and disseminating the results to her office over the system. It is not uncommon for people to become regular communication partners over the system, without ever meeting face to face.

Managers decided that the benefits of social use far outweighed the costs, and assumed that people would use discretion to insure that they did not let it interfere with their productivity. Research results supported this belief, as the extent of social use measured in the survey did not relate inversely to perceived productivity effects. On the other hand, there were several ways in which such social use was actually quite functional for the organization. A number of these are discussed below.

First, the argument can be made that social use stimulates more rapid learning of the system for new users and encourages the development of appropriate habits to help integrate the system into daily work routines. For electronic mail to be useful, users need to develop what has been called “message discipline,” where they learn to check mail frequently and respond within reasonable periods of time. Participating on social DLs provides new users with positive reinforcement for checking their mail and makes learning to use the system enjoyable.

Second, contacts are made in the course of social use that may become valuable in future work activities. Through discussions on DLs, new employees learn who has specific expertise in various areas, and thus expand their network of contacts. Moreover, through such policy discussions as described above, they learn norms of behavior more rapidly. Thus, the system potentially serves as a tool to speed up the social integration of new employees into the company. Research results supported this contention with the finding that newer employees were more likely to engage in social use than employees with more tenure in the company.

Third, social use of the system improved the quality of work life for many employees. Some interviewees felt that they could never work at a place that did not have a similar communication environment. In the high technology industries, any edge in recruiting and keeping highly trained professional staff is desirable.

Fourth, several interviewees credited social use of the system with fostering enhanced creativity. A situation described by a team of program-
A fourth issue was raised by what might be called political uses of the electronic mail system. For example, some users noted that they would occasionally use the system to request an action from someone, and then carbon copy that person's supervisor or coworkers to force a response. Another example with implications for vertical communication patterns in the company is the use of electronic mail instead of a telephone call in order to reach a manager whose calls are normally screened. The effects of such communication barrier bypasses have received little attention in the electronic mail literature.

Finally, one of the strongest benefits of broadcast uses of electronic mail—to make remote sources of expertise accessible—also represents a possible problem. Experts may tire if their services are called upon too often, resulting in a reduced desire to respond. If carried to the extreme, people would be forced to ignore requests, and the system would no longer be useful for this purpose. One interviewee agreed that broadcasting requests for remote consultation is good until everyone does it. Such broadcasts are less frequent according to the survey, however, providing evidence that the user community recognizes the potential problem and is voluntarily restricting such use.

CONCLUSION

This case study has illustrated that electronic mail can clearly be used for more than exchanges of routine information. It provides communication capabilities to employees that would have been unthinkable a few short years ago. The Xerox Corporation has encouraged free and unrestricted use by employees, and thus facilitated the growth of an active electronic community. Employees interviewed in this case study felt that as a result, Xerox is reaping the benefits of reduced turnover, enhanced productivity, and an improved quality of life at work. Managers are willing to allow social uses to flourish in order to obtain these benefits. Other organizations have not taken the same approach, and actively prohibit any personal use of their company electronic mail systems at all. Studies of electronic mail in these more restricted settings will likely reveal quite different patterns of use and effects, and such sites may not be realizing the full range of benefits afforded by this new and powerful communication medium.

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KEY TERMS

electronic mail
shadow functions
social presence
information richness
distribution lists
grapevine
broadcasting
access to remote expertise
communication norms
cross-locational project teams
socioemotional uses
message discipline
information overload
flaming

DISCUSSION QUESTIONS

1. How did the electronic mail system enhance the social aspects of work life at Xerox? What are some potential disadvantages of socioemotional uses of electronic mail in the workplace?

2. In what ways is "broadcasting" over electronic mail similar to our standard conceptions of broadcast communications? How is it different?

3. In what kinds of task situations is electronic mail most useful? In what situations would use of electronic mail be inappropriate or less useful? Why?

4. Compare and contrast electronic mail with other forms of communication media in terms of such attributes as speed of communications and feedback, sensory channels employed, and permanence of the message. How do these attributes relate to the ways in which electronic mail was used at Xerox? Can you think of other relevant attributes of media?

5. How might electronic mail be used as a political tool in an organization?

6. Discuss potential ethical (e.g., privacy) issues related to the use of electronic mail?

SUGGESTED READINGS


