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277

5 Experiences with New Forms of Organizational Communication via Electronic Mail and Voice Messaging

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SUMMARY

This chapter focuses on how various attributes of communication media can help explain some applications of electronic mail and voice mail that go beyond the simple substitution of applications that would otherwise occur via traditional media. The chapter uses data from surveys, observations, interviews, open-ended questions, and focus group transcripts to consider some of these uses, some contingent conditions that affect these uses, and some of the consequences—both positive and negative—that are associated with these uses. We suggest that some of the attributes of these new media provide opportunities for new forms of organizational communication.

5.1. INTRODUCTION

The essential role of communication in organizations is undisputed by researcher and practitioner alike.[1] With the continuing diffusion of office information systems in general (Keen, 1987), and computer-mediated communication systems in particular, organizational and communication research is now increasingly examining the implications of new media for organizational processes and structures.[2] The accumulated evidence is now beginning to

[1] Mintzberg, 1973; but see Rice and Shook, 1990a, for an extensive review, reinterpretation, and extension to managerial use of new media.

[2] For reviews of much of the early work, see Hiltz and Turoff, 1978; Johansen et al., 1979; Rice, 1980; and Short et al., 1976. But see Rice and Associates, 1984: Chapter 1 for an analysis that shows that sociologists lag very far behind popular, business, and communication researchers in this area.

demonstrate that computer-mediated communication systems (i.e. electronic mail, computer-based and other forms of teleconferencing, voice mail, and group decision support systems) enable a variety of new forms of interaction at work that were not convenient or even possible in the past.[3] In this chapter, results from one study of electronic mail[4] and one of voice mail[5] provide specific examples for our discussion of new forms of organizational communication. We do not, however, intend to provide a comprehensive review of other work (see footnotes 2 and 3).

A wide range of individual, group, and organizational factors influence the adoption, use, and consequences of media in organizations. Emerging theoretical perspectives focus attention on task requirements[6], the social information available in the work context[7], the attributes and dynamics of the community of potential users that influences formation of a critical mass of users[8], the shared symbolic meaning that organizational participants attribute to different media[9], and other individual, task, group, organizational, social and economic influences.[10] Such factors are necessary to explain the divergent usage patterns and consequences that emerge across different organizations implementing the same media. Yet these approaches cannot completely explain some new forms of organizational communication that either occurred in very different ways or did not exist at all prior to the use of the new media. Keeping in mind the broad spectrum of other influences, we feel it is still useful to analyse how these new communication applications influence forms of work, by linking them to the particular attributes of the media that make them possible. By analyzing fundamental attributes of technology, we are better able to understand the potential range of applications of new media as they are developed[11].

The next section describes four broad dimensions of attributes of communication media, along with specific attributes for each dimension. Following this, we relate what appear to be new uses of electronic mail to the four dimensions. We then provide a parallel analysis for voice mail.

[3] See Culnan and Markus, 1987; Rice and Associates, 1984; and Steinfield, 1986b, for relatively recent broad reviews of the computer-mediated communication literature.

[4] Steinfield, 1983, 1985, 1986a; Steinfield and Fulk, 1988a; 1988b.

[5] See Danowski and Rice, 1989 and Rice and Shook, 1990b, for more detailed descriptions of the voice mail study, covering a wide variety of other influences, and analyses of the semantic networks of the open-ended questionnaire responses.

[6] Daft and Lengel, 1984, 1986; Rice and Shook, 1990a; Saunders and Jones, 1990; Short et al., 1976; Williams, 1977.

[7] Fulk, et al., 1990; Rice et al., 1990.

[8] Markus, 1990; Rice, 1982, 1990a; Rice et al., 1989; Rice and Shook, 1988.

[9] Reinsch and Beswick, 1990; Rice and Shook, 1990b; Danowski and Rice, 1989; Trevino et al., 1990.

[10] Rice, 1987; Rice and Associates, 1984.

[11] See Nass and Mason, 1990, for a full explication of this line of reasoning.

5.2. FOUR DIMENSIONS OF COMMUNICATION MEDIA

All communication media — from dyadic face-to-face communication, through business memos, telephones, mass media, and new media such as electronic and voice mail — can be described as having more or less of a set of specific attributes (either objectively or as perceived by users) belonging to the following four broad dimensions (Rice, 1987; especially footnote to Table 1 in that article).

1) *Constraints* are the extent to which the user:

- can identify the sender: can the user determine who created or who sent the content?
- must know the other communicator's address: must the content be delivered to a specific receiver/address/account known in advance?
- is able to overcome the other communicator's selectivity: can the user easily ignore, skip over, delete or avoid the communication?
- maintain privacy: how easy is it to make the message public?
- must be temporally proximate: must the participants use the medium at the same time?
- must be geographically proximate: must the participants be in the same place?
- has access to the medium for initiating the process: are there technical, economic, physical, cognitive, or security obstacles to use?
- is able to store the message: can the user maintain a record or copy of the exact content?
- can retrieve the content at a later time: can the user search for the content on the basis of terms, keywords, dates, individuals, full text, sequence?
- is limited in message length: are there limits to line length, storage capacity, or duration of the message? Can the user "attach" other, perhaps lengthy, messages to the primary message?
- can reprocess the content of the message: can the user edit it and combine it with other content without having to re-create the message?
- can perform media transformations: how easily can the user convert the message from the initial medium into another medium?

2) *Bandwidth* is the extent to which the medium allows the representation of different communication modes, such as:

- proxemics: physical distance
- kinesics: gestures
- paralinguistics: tone, volume and non-grammatic sounds
- connotation: meaning
- denotation: data
- social presence or information richness: the extent to which the message communicates the presence of the participants, richness of interpersonal interaction, social and nonverbal cues, ambiguity, etc.

Bandwidth thus is an interaction of both real technical limitations (the standard telephone line can transmit only about a thousandth of the number of bits contained in a standard television signal in a given unit of time) and social or perceptual influences (the same content may involve many more contextual cues, and may be far more subject to various interpretations, in a face-to-face interaction compared to a business memo) on the meaning communicated.

3) *Interaction* is the extent to which the medium allows:

- quickness of response: how quickly are two communicants likely to complete a message exchange?
- control over pace of reception: can the user slow down, speed up, pause or even terminate the communication process?
- confirmation of the correct receiver: to what extent can the user ensure communication with the intended participant?
- the exchange of roles in sequences of interaction: can users be both senders and receivers? Must they communicate in chronological sequence?
- replying in the same interaction as receiving: can the medium use knowledge of the address and topic from an initial message to address and index replies?

4) *Network factors* are the extent to which the medium involves:

- different communication flows: is the communication flow one-to-one, one-to-many, few-to-few, or many-to-many?
- distortion: does the pattern of communication inherently delay communications, overload certain users, or allow one user to edit and then forward a message from another user?
- different communication roles: are gatekeepers or liaisons necessary or possible?
- critical mass: are multiple other interacting users necessary for the medium to have value to a user?

Computer-mediated communication systems represent new combinations of these attributes. Table 5.1 compares electronic mail and voice mail on these media attributes. The following sections discuss how the mix of constraint, bandwidth, interaction and network attributes enable electronic mail and voice messaging to alter, hinder, or reinforce organizational communication and ways of accomplishing work. Whether or not the forms of communication described actually develop in any setting, and the extent to which those changes will be interpreted as positive or negative, however, will also depend upon the wider confluence of individual and organizational factors already briefly noted.

5.3. NEW FORMS OF ORGANIZATIONAL COMMUNICATION VIA ELECTRONIC MAIL

Electronic mail has achieved considerable acceptance in all types of organizations, including businesses, government agencies, and universities[12]. At its simplest level, electronic mail provides the capability to create a textual message on a computer (or a remote terminal), transmit it to one or more recipients, and store the message in receivers' "electronic mailboxes" for subsequent display when they next use their computer (or a remote terminal). Most systems also provide features to facilitate the process of message creation, storage and processing, transmission, and reception. Such features include the ability to store "distribution lists" of destination addresses (so that the same message can be delivered simultaneously to multiple recipients), automatic reply capabilities, electronic filing, searching and retrieving functions for processing received messages, and many others. New developments incorporate graphics and digitized voice to accompany textual messages, as well as messages that can serve as executable programs upon receipt or invocation.

5.3.1. Context

We use a study completed in a large, multinational manufacturer and distributor of office information products to illustrate some of the new communication applications that this medium makes possible (see footnote 4). An electronic mail system had been in place at the time of the study for approximately seven years, and there were thousands of employees across the country and in some international sites with electronic mailboxes. Mailbox addresses were included in the company telephone directory, and use of the system was completely free for end users. Moreover, company policy encouraged its use for all communications at work, including a wide range of social communication among employees[13].

A combination of interviews with users, observations of system use, and a questionnaire sent to a random sample of 400 users (55% response) provided the data. Respondents worked in a range of professional, managerial, technical, and clerical jobs, although most were programmers (27%), engineering personnel (22%), and researchers (21%). Moreover, respondents indicated that an average of two-thirds of their relevant co-workers (people with whom they had a need to communicate) were also electronic mail users on the system (one way of operationalizing the concept of critical mass (Markus, 1990; Rice, Grant, Schmitz, and Torobin, 1990) (see Table 5.2).

[12] See Rice, 1987, for diffusion figures.

[13] A discussion of the qualities of this site that make it useful for understanding potential applications can be found in Steinfield, 1990.

TABLE 5.1
Media Attributes of Electronic Mail and Voice Mail

	Electronic Mail		*Voice Mail*	
Attribute	*One-to-One*	*Distribution List*	*Answering*	*Messaging*
Constraints				
Receiver can identify sender	Accounts shared?	Can be anonymous	Not necessarily	Yes, spoken name
Have to know receiver's account/address/number	Yes	No	Not necessarily	Yes
Can overcome selectivity	No	No; but can put public pressure	No	No; but can put public pressure
Can maintain privacy	Depends	No	Can provide client accounts	Can provide client accounts
Need temporal proximity	No; but can be	No	No	No
Need geographical proximity	No	No	No	No
Access: physical	Limited	More limited	Pushbutton phone near universal	Pushbutton phone but need account
Access: interface	Can be complex	Can be complex	Voice-prompting	Voice-prompting
Can store content	Yes	Yes	Sender can re-hear and delete messages	Yes
Limits to message length	No	No	Yes	Yes
Use to transfer documents	Yes	Yes	No	No
Can retrieve by indices or browse in random order	Yes	Yes	No	Limited – if urgent; mostly linear
Receiver can reprocess, edit for further use	Yes	Yes	Limited – forward, annotate, distrib	More – reply, forward annotate, distrib
Convert to other medium	Print, voice	Print, voice	No	No
Bandwidth				
Distance	No	No	No	No
Gestures	No	No	No	No
Tone, emphasis	Little	Little	Yes	Yes
Connotation	Moderate – may be misunderstanding	Moderate – may be misunderstanding	Yes	Yes
Denotation	Yes	Yes	Yes, but may miss details	Yes, but may miss details
Social presence, information richness	Low	Low	Low	Moderate
'Personal' greeting	No	No	Yes	Yes
Interaction				
Quickness of response by intended receiver	More/less than other media	Can be multiple and quick	More/less than other media	Can be multiple and quick
Control receiving pace	Yes	Yes	Not for caller	Moderate; urgent/variable playback
Confirm correct receiver	No	No	Yes, spoken name	Yes, spoken name
Mutual discourse	Yes but lagged	Multiple threads	No	Multiple threads
Quick reply feature	Yes	Not necessarily	No	Yes
Network				
Information flow	One-to-One	One-to-Many	One-to-One	One/many to many
Distortion – overload, forward edited message	Yes	Public record	No	No; can prevent forwarding
Role effect – overload	Moderate	Can structure	Possible	Linked annotations
Critical mass necessary	Not necessarily	Yes	No	Yes

The next section examines the diverse uses of electronic mail. Following this, we explore some of the perceived impacts of electronic mail, as well as the relationships between one new form of internal organizational communication—which we call broadcasting—and the perceived impacts.

5.3.2. Uses of Electronic Mail for Broadcasting

Thirty types of uses, developed after interviews and observation, were rated by respondents according to the extent to which they used the system for each purpose (see Table 5.2). We also asked respondents to indicate the number of work-related and social (non-work-related) electronic distribution lists to which they belonged and which they were responsible for forming.

One set of uses reflected a form of communication that has no direct analogy with communication via traditional organizational media. That is, individuals used the electronic mail system to broadcast messages to large numbers of recipients. This type of use is a direct consequence of the one-to-many and many-to-many network flows possible on a computer-mediated communication system. The system in use at this organization allowed the creation of distribution lists of any size. In fact, many lists were "public", in the sense that individual users could place their own electronic mail addresses onto a list, ensuring that they would receive all future messages addressed to that list. To be sure, an individual could send the same message to large numbers of employees via the regular mail or internal company mail. However, it is the combination of interaction factors and lack of constraints outlined earlier, along with this network flow capability, that truly differentiates this form of communication from hard copy mass mailing. Interaction factors come into play because recipients can reply immediately, with responses instantly sent back to the entire distribution list as well as to the original sender. Freedom from temporal and geographic constraints, as well as freedom from having to know recipients' addresses, further contribute to make this both quantitatively and qualitatively a different form of communication.

Of the thirty uses listed in Table 5.2, ten can be considered "broadcast" uses. In a factor analysis of the ten uses, Steinfield and Fulk (1988a,b) found that they clustered into three dimensions reminiscent of classical functions of mass media: (1) surveillance, (2) consensus and control, and (3) entertainment (see Table 5.3). Scales for each factor were created by computing the mean of the factor's high loading items.

Respondents used the broadcast aspects of the system most often for surveillance. Belonging to selected distribution lists enabled individuals to keep track of company happenings, and to learn of interesting events taking place or other information of interest. The electronic mail system not only allowed "news" to be disseminated rapidly, but also to be discussed and interpreted by large electronic communities. One implication here is that organizational executives

TABLE 5.2
Descriptive Statistics for Uses of Electronic Mail, Distribution List Participation and Critical Mass

Variables	*Mean*	*S.D.*
Uses:[a]		
Send a message in place of a phone call.	3.5	1.24
Distribute/provide information.	3.4	1.17
*Learn about events/things I'm interested in.	3.4	1.19
Seek task information from people I know.	3.3	1.28
*Keep track of company happenings.	3.3	1.24
Give/receive feedback on reports/ideas.	3.2	1.13
Coordinate activities of projects I'm on.	2.9	1.33
Keep a record of agreements/interactions.	2.8	1.38
Send/receive pointers to large files.	2.7	1.30
Schedule meetings/appointments.	2.7	1.33
Monitor progress of projects I work with.	2.6	1.42
*Broadcast requests for information.	2.5	1.10
Keep in touch/maintain relationships.	2.4	1.18
*Take a break from my work.	2.4	1.19
Brainstorm/generate ideas.	2.3	1.08
*Participate in entertaining events or conversations.	2.2	1.19
Forward messages to someone.	2.1	0.97
*Organize/coordinate a social activity.	1.8	1.08
Resolve conflicts/disagreements.	1.8	0.97
*Poll opinions on a topic.	1.8	0.98
*Advertise/respond to products for sale.	1.8	0.91
*Fill up free time.	1.7	1.01
*Ask questions in a public setting to force response.	1.7	0.92
Carry on negotiations/bargain.	1.7	0.92
Get a message through a call screen.	1.7	0.98
Get to know someone.	1.6	0.78
Monitor performance of subordinates.	1.6	1.05
Ensure people use distribution lists appropriately.	1.5	0.82
Discuss confidential matters.	1.5	0.75
Find out about job/promotion openings.	1.3	0.58
Critical Mass:		
Percent of relevant co-workers on system	66.6	30.5
Distribution List Membership:		
Work distribution lists member	6.90	7.17
Social distribution lists member	5.33	5.25
Work distribution lists founded	0.81	2.59
Social distribution lists founded	0.37	2.16

[a] = Scale was 1 = never; 5 = very often.
* = 'broadcast' use

TABLE 5.3
Factor Analysis of Uses of CMC Broadcasting

	Factors		
Questionnaire Items	*Entertainment*	*Consensus/Control*	*Surveillance*
Fill up free time	0.85	0.25	0.09
Take breaks from work	0.84	0.34	0.19
Participate in entertaining events	0.66	0.53	0.37
Ask questions in public setting	0.23	0.79	0.05
Poll opinions	0.49	0.76	0.14
Broadcast info. requests	0.11	0.74	0.29
Organize social activity	0.44	0.65	0.28
Advertise/buy products	0.45	0.47	0.30
Keep track of company happenings	0.04	0.18	0.88
Learn of interesting events	0.59	0.28	0.73
Variance Explained	38.6%	12.4%	11.1%
Cronbach's Alpha	0.55	0.74	0.75
Scale Mean	2.15	1.97	3.45
Scale S.D.	0.91	0.70	0.93

Dimensions are principal components with oblique rotation.
Scale was 1 = never; 5 = very often.

could respond quickly via broadcast electronic mail when potentially controversial events of concern to employees took place[14].

The consensus and control uses reflected a more active and transactional use of the system. People asked questions in a public setting (in order to force a response), polled opinions, broadcast requests for information, organized social activities, and advertised and bought products for sale, all entirely over the electronic mail system.

One of the benefits of such uses as opinion polling and broadcasting information requests is the increased access to information and remote expertise. In large organizations with in-house research and development centres, there is a large pool of technical knowledge potentially available to employees. Public distribution lists on the electronic mail system provide a means of linking those in need of information with those possessing it, without requiring knowledge of the identity of the remote sources of expertise[15].

If an information request dealt with a topic of relevance to a number of people in the company, large discussions would ensue over the electronic mail system.

[14] See Rice, 1990b, for a discussion of the use of new organizational media for crisis management.

[15] This internal electronic information marketplace facilitated by the diffusion of information technologies has been proposed by several authors (Dordick et al., 1981; Turoff, 1986), and has been identified in other studies of the same organization (Finholt and Sproull, 1989; Steinfield, 1990).

A request might start with "Anyone know anything about . . .?". Over the next several days, people would provide advice, amplify the question, debate the merits of particular solutions or opinions, and eventually tire of the topic and agree to stop putting their comments on the distribution list. In other situations, if the information request was technical and perhaps not of general interest to a large population, the original requesting user would ask to have responses sent only to him or her, rather than to a distribution list. The original requester would then create a file of the responses, store it on a file server, and then send a message to the distribution list informing anyone who might be interested where the file was stored. Thus, users could gather a wealth of useful information and easily make it publicly available to others with the same information needs. Note also that such information gathering and disseminating essentially bypassed normal organizational boundaries, reducing reliance on standard boundary-spanning and gatekeeping roles.

One negative implication is that such use, if carried to an extreme, could overload sources of expertise, even to the point of forcing them to ignore requests for information. Hiltz and Turoff (1985) discuss some of the individual, organizational and technical ways not only to manage such problems, but also to take advantage of the potential wealth of information in these internal broadcasting processes.

The third cluster of broadcast uses involved an entertainment function of the system. People indicated some use of the system for participating in games or entertaining events and discussions, taking breaks from work, and filling up free time such as during lunch or coffee breaks. Some lists were dedicated to telling stories and jokes, or sharing information unrelated to tasks. Socially oriented distribution lists functioned like "virtual" clubs, where people gathered electronically to discuss favourite hobbies, places to eat or drink, music preferences, and so forth. Many individuals became regular communication partners on the system, without ever having met face-to-face. The common finding from other electronic mail studies that use of electronic mail results in communicating with new people (Rice and Case, 1983) seems like a gross understatement given this usage context. Previous analyses also demonstrate that heavier "social" users of the system also tend to be newer and younger employees, suggesting that these uses may be serving a socialization function as well (Steinfield, 1986a)[16].

Occasionally discussions centred on political or otherwise contentious topics, and the messages became quite heated. Users noted instances of "flaming": the tendency to react more emotionally, ignoring face-to-face social norms of conversational courtesy or restraint, sometimes leading to an escalation of conflict. These examples illustrate that although a "low bandwidth" medium may

[16] Such socializing and entertainment uses have been found to be quite commonplace in public computer bulletin boards (Hiltz and Turoff, 1978; Rice and Love, 1987) and are widely discussed on inter-university bulletin boards.

indeed be used for interpersonally involving communications, users must be cognisant of the potential effects of electronic mail's filtering of social cues[17]. Sophisticated users learned how to pepper their attempts at humour or sarcasm with text-based nonverbal cues (paralinguistics) such as various punctuations for *emphasis* or "sideways happy faces":-) in order to avoid misinterpretation.

The broadcast uses described earlier show how, in particular, the network flows afforded by electronic mail enable new forms of communication at work. Additional broadcasting uses are enabled by interaction factors such as the ability to respond rapidly by the removal of temporal, geographic, and address constraints. Moreover, even bandwidth factors are relevant, as the social use of electronic mail, flaming, and the ability to add paralinguistic cues, demonstrate.

5.3.3. Dyadic and Small Group Uses of Electronic Mail

A number of other uses identified in the study do not necessarily involve broadcasting, but are evidence of communication patterns that may not have existed prior to the electronic mail system. Electronic mail's freedom from constraints, for example, enabled more effective communications between cross-locational project teams. Frequent system uses such as coordinating project activities, monitoring project progress, distributing information, giving and receiving feedback on reports or ideas, brainstorming, and keeping in touch with others (see Table 5.2), all suggest ways in which the system helps to support such cross-location teams. Once again, network factors (e.g. ability to send messages to the entire project team simultaneously) and interaction attributes (rapid response) combine with electronic mail's freedom from constraints to make such applications possible.

5.3.4. Unanticipated Consequences of New Communication Forms

One barrier to communication that electronic mail can overcome is the tendency for certain, usually more senior, people to screen communication attempts via the more traditional in-person meetings, telephone calls, and paper mail. Unless those senior personnel have their secretaries screen electronic mail as well, other employees can directly communicate with them through the system. Although not a frequent use, most people in the study reported at least occasionally sending a message to get through to someone whose calls are normally screened. This ability to bypass traditional organizational communication flows can have both positive (more horizontal organizational structures and organization-wide participation) as well as negative (overloading higher levels, lack of local responsibility and control) implications.

[17] Also see Rice, 1984, for a detailed discussion of the sometimes paradoxical consequences of the reduced communication bandwidth in electronic mail and computer bulletin boards.

The ability to forward intact messages to new receivers who may be unknown to the original sender, although not a capability unique to electronic mail, also takes on new implications in the electronic mail environment. This is especially the case on systems where large distribution lists proliferate. Senders lose control over potentially sensitive or proprietary messages once sent. A message may be forwarded to someone who is unaware of the sensitivity of the content, and who subsequently forwards the message to inappropriate recipients. As intra-organizational networks become linked with outside networks, there is an increasing danger of proprietary or highly contextual information becoming available to outsiders. In the organization studied, one message sent to a large distribution list warned list members to take more care with the messages sent to the list. It pointed out that the list was a public one, and actually had some members who were not employees of the company. Most employees did not examine all of the user addresses that belong to large lists, increasing the danger of accidentally sending proprietary information to the wrong places. Singer (1980) has speculated that both of these kinds of changes in organizational communication—bypassing authority structures, and electronic dissemination of communications—could lead to a loss of accountability and personal responsibility, and an increase in alienated and misdirected external clients, because the content of organizational mass communications becomes disassociated from specific individuals.

5.3.5. Impacts of Electronic Mail Use

A second set of responses consisted of ratings of 21 types of impacts. The 21 impact items factored into five dimensions (see Table 5.4). Scales were created by computing the mean of the high-loading items for each factor. The first factor represented how well connected the user is with the company as well as the effect of the system on the quality of information accessed by individuals. A second factor represented the flexibility of both time and space that electronic mail permits, as well as the enhanced productivity that results from use. A third factor represented the effect of using electronic mail on cohesiveness and coordination of the work unit. A fourth factor represented the potential information overload consequences of electronic mail use. A fifth factor represented the impersonalness of using electronic mail.

According to the scale means (Table 5.4), respondents were likely to feel that electronic mail resulted in improved connectedness with the company and in greater access to higher quality information. They were also likely to feel that electronic mail enhanced work flexibility, and contributed to improved productivity. Mean scores were at about the midpoint of the cohesiveness scale. Finally, respondents were somewhat less likely to perceive information overload as a result of the system, and did not agree that electronic mail resulted in a more impersonal workplace. In order to assess some of the influences on these five dimensions of impacts, each of the five impact scales was regressed on the three

TABLE 5.4
Descriptive Statistics and Factor Analysis of 21 Impacts of Electronic Mail Use

	Factors						
Variables	Connl InfoQual	FlxWrkl Prdctve	Cohesive	Overload	Impersonal	Mean	S.D.
Have more work contacts	0.78	0.23	0.20	-0.05	-0.04	4.5	1.7
Have more friends	0.76	0.03	0.22	-0.19	0.23	3.3	1.7
More visible at work	0.75	0.15	0.28	-0.07	0.11	3.8	1.7
Keep in touch more	0.74	0.19	0.21	-0.03	0.05	4.6	1.7
Know more about company	0.64	0.17	-0.05	0.11	-0.26	4.9	1.5
Get more timely info.	0.61	0.40	0.22	0.17	-0.30	5.2	1.4
Get more accurate info.	0.55	0.32	0.22	0.02	-0.36	4.7	1.4
Supervisor different loc.	0.08	0.84	0.08	-0.17	0.18	3.8	2.0
Co-workers different loc.	0.21	0.75	0.13	-0.05	0.00	4.2	1.9
Work outside workday	0.24	0.67	-0.02	0.03	0.23	3.8	2.1
Work faster	0.41	0.59	0.40	-0.01	-0.24	4.6	1.7
Work is higher quality	0.50	0.54	0.42	-0.02	-0.17	4.5	1.6
Have fewer interruptions	0.41	0.45	0.42	-0.10	-0.02	4.0	1.8
Work more coordinated	0.27	0.16	0.85	-0.02	0.01	4.0	1.7
Dept. more cohesive	0.33	0.13	0.79	0.06	0.03	3.9	1.8
Swamped with info.	0.06	-0.07	0.02	0.74	0.18	3.1	1.4
Correl. info. wastes time	-0.24	0.02	-0.07	0.72	0.06	3.4	1.6
Overloaded after trips	0.10	-0.04	0.27	0.71	-0.08	4.7	1.8
Waste time reading mail	-0.02	-0.13	-0.29	0.69	0.29	1.9	1.5
More closely supervised	0.05	0.12	0.09	0.11	0.79	2.1	1.1
Place less personal	-0.09	0.11	-0.07	0.24	0.58	2.6	1.4
Variance Explained	34.5%	11.3%	8.0%	5.9%	5.2%		
Cronbach's Alpha	0.88	0.86	0.72	0.52	—		
Scale Mean	4.44	4.16	3.95	3.53	2.33		
Scale S.D.	1.21	1.41	1.61	1.15	1.01		

Dimensions are orthogonal principal components with varimax rotation. Scale measured the extent to which respondent experienced the impact, from 1= very low to 7 = very high.

use factors, the number of work and social distribution lists belonged to or founded, and critical mass (percentage of co-workers on system). Table 5.5 provides the multiple regression results.

For two of the impact scales—perceived connectedness/information quality and perceived cohesiveness—roughly one third of the variance can be explained. The critical mass variable was a significant predictor for both, underscoring the importance of widespread access and use as a prerequisite to broader benefits

TABLE 5.5
Multiple Regressions Predicting Impacts from Broadcast Uses

	Dependent Variables				
Independent Variables	Connectl InfoQual	FlexWorkl Productive	Cohesive	Overload	Impersonal
Purposes of Use					
Surveillance	0.18*	0.21*	—	—	—
Consensus/control	0.20*	0.23*	0.28**	—	—
Entertainment	0.18*	—	—	—	—
Distribution List Use					
Work DLs founded	—	—	—	—	—
Work DLs member	0.30**	0.27**	—	—	—
Social DLs founded					
Social DLs member	—	-0.20*	—	—	—
Critical Mass					
Percent of relevant co-workers on system	0.20**	0.20**	0.42***	—	—
Adjusted R^2	0.32	0.19	0.30	—	—

* $p<0.05$; ** $p<0.01$; *** $p<0.001$
Table entries are standardized regression coefficients (betas) significant at $p<0.05$ or better.

of the use of new media. The connectedness/information quality factor was also explained by use of electronic mail for consensus and control, surveillance, and entertainment, as well as by membership in more work distribution lists. The perceived cohesiveness scale was also explained by consensus/control uses. Nearly 20% of the variance in the work flexibility/productivity factor was explained by use of the system for consensus/control and surveillance, critical mass, and, negatively, the number of socially oriented distribution lists to which someone belonged. (Based upon the simple correlation between these variables (r=0.11), this negative influence may be a result of a suppression effect.) A statistically significant amount of variance in the remaining two impact scales (information overload, and impersonalness of the workplace) could not be explained by the set of independent variables used in this study.

5.3.6. Summary: Electronic Mail Uses and Impacts

The pattern of findings described in this study provides at least four key insights into broadcast uses of CMC and possible effects in an organizational setting. First, people do use electronic mail for broadcasting in organizations. Although they do not broadcast messages as often as they send a one-on-one message (see Steinfield,

1985), even a rare broadcast message is a new form of organizational communication for the individual user. Never before could one employee reach all corners of a large, decentralized, multinational organization simultaneously with just a few taps on a keyboard. Of course, an electronic mail system can be designed to limit access to certain mailboxes or to certain directions of communication (Hiltz and Turoff, 1985). The system studied here had no such constraints.

Second, it is possible to cluster the purposes of broadcast electronic mail into functions that resemble categories from classic mass communication theory. That is, people appear to use such broadcast capabilities for surveillance purposes (such as keeping track of things occurring around the company), consensus and control purposes (such as polling opinions or requesting information from large numbers of people), and entertainment (such as participating in games or enjoyable conversations). The multiplicative power of broadcasts requires only a small number of users who actually broadcast a message, and system capabilities for distribution lists.

What is different from traditional mass media, however, is that the interactive capability of electronic mail enables a user to develop a more interpersonal relationship with someone who has broadcast information of interest, simply by providing a direct reply. Such use can thus link together sources of information with those who may be in need. Interestingly, the use of electronic mail broadcasting for the consensus/control function was associated with the greatest variety of impacts. This function was related to greater connectedness/ information quality, work flexibility/ productivity, and cohesiveness.

Third, even in an organizational setting, the system was used for entertainment purposes, and many people do belong to socially-oriented distribution lists. Of concern to the organization is whether this is unproductive, dysfunctional behaviour, or beneficial in some ways. Steinfield (1985, 1986a) argues that such uses may actually help to socialize new employees, acclimate them to the system, help them to form communication relationships that will be of value in future work tasks, and potentially enhance employees' abilities to approach problems creatively. Moreover, the finding that entertainment use predicts greater perceived connectedness to the company suggests that it may be functional (more friends, contacts, and visibility). Interestingly, entertainment use was unrelated to any of the other four impacts. It does not appear to enhance productivity, but it does not appear to increase reception of irrelevant mail either. Nevertheless, management concerns that expensive systems are being used for personal reasons on the job are understandable. This issue will require careful evaluation in multiple settings before firm conclusions can be drawn.

Last, establishing a critical mass of users does appear to be necessary for work-related benefits to accrue. Users with a larger proportion of relevant coworkers on the system do believe that they experience greater connectedness to the company, access to higher quality information, more productivity, and a more cohesive work unit (see similar results in Rice et al., 1990).

5.4. NEW FORMS OF ORGANIZATIONAL COMMUNICATION VIA VOICE MESSAGING

Voice messaging (VM) is a combination of telephone and computer technologies that provides store-and-forward audio communication capabilities. Spoken messages are digitized and stored on the hard disks of a mini-computer. These messages can be (1) pre-recorded system prompts, (2) the account-holder's spoken name to indicate the account is the desired one, (3) the account-holder's personal messages, or (4) the caller's message. The caller's message can be stored until the account-holder dials into the system to listen to the waiting messages. The user communicates with the voice mail program (selecting functions, account-holders, distribution lists, etc.) by pressing the keys of a push-button telephone.

There are two primary categories of users. Those who do not have a VM account (this may include both those who are members of the organization as well as external individuals) may call someone who does have an account. If the intended recipient is not there, or chooses not to answer, the system answers the call with pre-recorded voice prompts and allows the caller to leave a message or be connected to another telephone number or an operator. Those who do have an account may, of course, use the regular phone to dial another account holder's telephone, and have their messages processed similarly. However, if they first dial into their own VM account, using the keypad to provide their account number and password, they may then use the full capabilities of the VM system. These include a wide range of features, such as listening to messages, replying to the sender, forwarding a message sent by someone else to third parties (perhaps adding a voice annotation), sending a message to a pre-established distribution list of receivers, sending "urgent" or "private" messages, fast-forwarding through waiting or previously archived messages, deleting messages, changing a greeting message, leaving messages to be sent at future dates, etc. Thus there are two primary conceptual distinctions about the use of VM:

1) Voice answering: A caller hears your voice mail greeting when you aren't answering the phone. The caller can leave a message for you to listen to later. Thus, VM is little different from an answering machine. This is, generally, how most implementors, managers, and users perceive VM.

2) Voice messaging: Someone else on the system intentionally dials into their VM account and then sends other account-holders a message, regardless of whether the others are actually in their office or using their telephone or not. Account-holders can use functions that process their own message, and reprocess their received messages.The first category of user (no account) can use VM only for voice answering when they call someone who does have an account. The second category of user (has account) can use VM for both answering and messaging when calling or listening.This distinction between answering and messaging also implies that the use of voice messaging is not meant simply to

substitute for being available by phone whenever possible. Rather, its function is to:

- assist people in getting access to each other for information, instruction, and authority when they would not otherwise be available because they are using their phone, are out of the office, or must communicate at different times;
- enable the processing, re-processing and coordinating of communications;
- avoid interruptions or improve communication when direct interaction is not desired or necessary.

5.4.1. Context

The following sections summarize a selected set of primarily qualitative results from a longitudinal study of voice messaging implementation at a large insurance company. The full analysis involved three time periods: a pre-implementation baseline study (T1), an early post-implementation study about six months later (T2), and a late post-implementation study about another year later (T3). While the full study included four different treatment groups in four cities, we report here only on comments from open-ended questionnaire responses, focus group discussions, and personal interviews, from the before–after "pilot" group at T2 (See footnote 5).

At T2, we held five executive focus groups involving a total of 25 middle managers participating in the pilot. We also conducted interviews by phone and in person with six high-level executives whose schedules would not permit them to participate in the focus groups. The T2 questionnaire data provide the verbatim responses to several open-ended questions (See footnote 5). The total number of questionnaire respondents at T2 was 298 (53% of all sampled respondents). Computer-monitored usage data showed that 60% of the 555 T2 account holders used VM for sending messages, and 80% for receiving/answering messages. Respondents reported sending and receiving about 7 messages per day. The pilot group reported using VM considerably more for messaging (about 30–35%) than for answering than did the other groups (about 10–15%), indicating a significant effect of a conscious implementation strategy for the before–after "pilot" group that emphasized messaging rather than answering. Example comments from the focus groups and personal interviews are organized by the four dimensions of media attributes. Summaries of the open-ended questions follow these sections.

5.4.2. Constraints

Overcoming Temporal and Geographical Constraints. VM combines attributes typically associated with the telephone (easy access and use) and electronic mail (store-and-forward) to overcome common time and space constraints:

> I'll basically be out of the office for the next three weeks, on the road. So my people will dump off their questions in my mailbox, and I will return my answers to their questions to their mailbox. They'll also be in odd places calling in from payphones. We will move a lot of work that way. The ability to record messages coming in and transfer them saves me hours.

Overcoming Problems of Addressability. Phone calls rely upon proper addressing to be handled easily. The caller must know and dial the correct number. Traditionally, any message taker must record the caller's number correctly, and forward the message to the correct person or location. VM can manage incorrect addressing by allowing rerouting or storage of the original call:

> The insured calls in, or perhaps the agent. For some reason, the claims adjuster assigned to the case has changed. Maybe the adjuster I assigned was going to another area and asked someone else to pick up this case. When I direct the message to the first person, that person can turn it around and send it on to the person who actually has the job.

External Accessibility to Organizational Members. Traditional organizational boundaries have built-in constraints to accessibility by individuals outside those boundaries (both for organizational members as well as non-organizational members). Some of those constraints are simply due to limited processing ability through telephone lines that may even create multiplicative constraints (such as "media transformation" errors when organizational members have to write down phone messages from customers for the appropriate member, or "shadow costs" when it takes time to confirm whether an appointment is convenient) (Rice and Bair, 1984). Other constraints involve a caller's not knowing beforehand whether the internal member will be available, and not being able to contact the person when an emergency problem arises:

> All calls now go directly to the appropriate appraisers. The appraisers were never assigned desk space or telephones here in the office simply due to the fact that they weren't in the office that often. Now they all have a VM number. On their printed-out appraisals and so forth, their VM number comes out on that. The phone calls come into that VM number and they have to call in twice a day, and they're expected to return those phone calls within four hours. The number of complaints has dropped dramatically. Dramatically. I mean that. You know, when I say that, I'm talking about they're down by 80 percent.

Storing and Retrieving the Message to Enhance Understanding. As with electronic mail, VM can be used to archive messages for later clarification. Although they cannot be converted into another medium within the system—they must be transcribed in order to have a printed record—in some ways archived VM messages are more accessible. Indeed, one intriguing application

that some users developed consisted of turning on the system in the middle of a regular telephone call in order to record the conversation, and then sending a copy of that synchronous conversation to relevant others for asynchronous review and response:

> There's been a number of occasions when I've had them forwarded to my phone just to let me hear what it is so that, you know, something doesn't blow up later on. And, it's a matter of back up, if you will, and a way of keeping track or a log of what's going on.

5.4.3. Bandwidth

Managing Meaning. VM also can be used to foster greater understanding in complex situations and to maintain the interpretation of the original communication:

> The feature of taking comments coming in and then forwarding them to another phone was essential a couple of times. It saved me a tremendous amount of work and I could put my tags on it and I could also say "here's what the person said", instead of calling up one of my supervisors and say so and so's complaining about how we handled this, and then using my own words to describe it which may underintensify it and neutralize it.

5.4.4. Interaction

Improving Feedback. VM gives greater control to the participants over their timing and style of response:

> You take a case where we get a hundred questions that came in that ask us specifically about what our company's all about and how we handle things. Let's say three of the questions that apply to our claim department or our claims systems have not been frequently asked in the past, and therefore, those of us in the marketing department may not have a ready answer. It would be a lot easier for someone in my department to pick up the phone, access the proper person's voice mail box, for instance, and ask him the three questions and allow him to respond at his convenience and get the answer into the asker's box rather than the process we go through now [telephone tag or sending memos].

Coordinating Multiple Actors. The number of separate interactions can increase exponentially with the number of actors involved in a complex problem, each with their own separate constraints, all leading to spiralling consequences for coordination. Further, traditional communication only allows a chronologically linear sequence of interaction, so the final agreed-upon meaning or decision is delayed by the cumulative constraints on each interaction. VM can reduce some of the constraints related to multiple intermediaries:

> I had one situation where we were very quickly trying to determine if the company could buy a piece of a product we were offering to the public. We wound up having 12 different parties representing 12 different areas of the company that needed to get involved in that decision. Several different lawyers, and it was a mess. I would have personally plopped down a hundred bucks [for voice messaging] on that one because I was able to copy two or three lawyers, but the others weren't on the system. I had to stop and write them memos.

On the other hand, because they allow non-sequential interaction, both VM and email display messages in the order in which they are received, not the order in which they are related. Thus a simple listing of one's waiting messages represents "multiple threads of conversation" that may make it difficult to follow a single topic through all the prior and current messages (Hiltz and Turoff, 1978). Some email systems allow the user to read just those messages that are "replies" to earlier messages, or to sort and associate messages according to author, topic, or message header. Few VM systems provide ways to resolve the problem of multiple threads of conversation. At best, the user could listen to all the "urgent" messages first, or "speed listen" through the waiting or archived messages. Another approach would be to set up several subaccounts, and "forward" related messages to each different subaccount for later retrieval.

Coordination Under Constraints. In general, the costs of coordinating and supervising more than a few individuals outside a limited temporal and spatial arena are quite high. VM can provide one way to improve coordination efforts. One intriguing application of VM was chained and annotated delegation. For example, a high-level manager may receive a general request, and forward that to the appropriate supervisor. The supervisor may confirm its receipt (to let the manager know the supervisor is now responsible), and send the original request with specific delegation comments to several subordinates, perhaps all on a single distribution list. One of the subordinates may reply by confirming the delegation with a request for clarification. In this fashion, everyone is kept informed of the process, the delay between interactions in minimized, and no one can later claim they did not receive the delegated task:

> I have two automation analysts that are on the road constantly, and for me to be in touch with them, it's very difficult 'cause they each have about 35, 40 agents that they have to call on, and their time is really in demand. So, if I don't talk to them after hours, which was the way it was prior to voice mail, I may not see them for ten days at a time. It's difficult to supervise people when you don't see them for an extended period of time. So, other than their itineraries, I really didn't know where they were, okay. So now they're constantly calling my mailbox, leave a message, let me know: I'm leaving this agency, or I'm going to be stuck here, I'm not going to be able to get to the next agency. It's truly helped me supervise. I have a better sense of how they are working, especially if they're delayed.

Competitive Advantage Through Reduced Constraints on Coordination. Being better able to coordinate internal activities means being better able to respond to environmental changes. When managed properly, this change can mean greater competitive advantage, either in developing products, obtaining resources, or providing service. One way some users extended the department's or organization's boundaries was to provide VM accounts to their frequent or important clients or specified employees in other departments at other locations. Providing them access and control in this way improved perceptions of the personalness and competence of the organization or department:

> There is so much telephone interaction between our department and other departments in the division that if you can cut that down, you're going to be able to cut down the turnaround time that it will take us to respond to a set of group insurance specifications. Three or four weeks is the typical time we'd like to have. Most of the time nowadays we're being given two or three weeks by brokers or consultants or agents. Five percent, in other words, if we could do ten more proposals a year because of voice messaging, it wouldn't surprise me. And I think, of course that would [require] a comprehensive network and a very solid understanding about [how] each department is going to use it in the effort of responding to bid specifications.

5.4.5. Network Flows

Broadcasting (One-to-Many Networking). Because many organizational activities involve a well-known set of individuals occupying established organizational roles, different one-to-many broadcast communication networks can be pre-established through distribution lists:

> I like the group distribution feature. Before I had to dictate an action slip to my secretary, she would type it out and get copies, then deliver them in person. Now I dictate into voice messaging and that's it. VM is both an interpersonal as well as a mass medium, because a single message that is relevant to a specific set of individuals can be made available to them with only one action, rather than requiring separate interactions for each individual. We have a lot of need to interact personally, for example, about a particular pension investment account. As a consequence, we set up a lot of meetings. We send around memos that say this will confirm the meeting at 8:30 Tuesday morning, September 1st. And they miss. You know, people literally don't make the meeting. The paper problem is absolutely awesome. So, a quick reminder on voice messaging, and you remember when we have the real estate review meeting.

Overcoming Gatekeeping Overload. The regular telephone is essentially a one-to-one medium, but certain system configurations, such having as a central organizational switchboard, or having departmental phone answering jobs, create a many-to-one situation, leading to system, and user, overload. Quantitative data from the VM study showed decreases in the number of message slips taken and the average amount of time it took to answer a phone call from external clients, and an increase in the number of external calls handled during lunch hour:

> The dispatcher took the messages and piled them up according to the individual. And if I had 15 individuals outside working, well, they were supposed to call in twice a day. Well, if one was on the line and he had a lot of messages and two others were calling in, they couldn't reach the [telephone call] dispatcher because the phone was busy. Then they would get disgusted and say, well I'll call later. So they'd call later, but then two more would be on waiting. So in some cases, we just didn't have enough capability to give out the messages. Even though we had a dispatcher doing it there all day. So, and a lot of days they would just get so frustrated, they wouldn't even call in. Every time they stopped at a phone booth, the number was busy. [VM has removed that problem.] Some users developed ways to use the system as a personal overload mechanism, by recording a reminder and sending it to their own account at a future date—sort of an audio tickler file. On the other hand, several people noted that VM represented yet another "in-box" to maintain, and that the log-on commands were lengthy, both of which could contribute to communication overload.

Critical Mass. Several respondents noted that the multiple in-box problem was caused by the fact that only a subset of the organizational members had VM accounts, so that users would still have to check all the traditional "in-boxes" but now had one extra that was useful for only some of their communications. For example, an organizational member who did not have a VM account might leave a voice answering message, but, instead of using the "reply" function within the system, the VM user would have to exit the system and use the regular phone, or send a written memo. The same problem arose with the use of distribution lists. Several VM users noted that they could use such lists to reach only a subset of all those who should receive the message; so they occasionally sent the same message through both a memo and a VM distribution list.

Finally, users in the pilot group explicitly noted that having only a subset of departments on the system prevented many organizational-wide benefits from developing. Beswick and Reinsch (1987) also noted that the three most frequent complaints provided to an open-ended question on their survey were concerned with critical mass (necessary co-workers are not on system, people do not check their voiceboxes, and all members should be on the system).

5.4.6. Open-ended Comments

The responses to open-ended questionnaire items were coded into categories of positive, negative, mixed and requests. Table 5.6 presents only those comments out of 99 different comments that were provided by more than 5% of the

respondents. This listing does not discriminate between messagers and answerers, high and low users, or users and non-users; see Rice and Danowski (1993) for analyses of the comments by these type of users.

TABLE 5.6
Most Frequent Responses to Open-ended Questions on Time 2 Questionnaires

Open-Ended Question	*N*	*Percent*
How has voice messaging changed the way you communicate with others?		
M – Little or no impact	45	20.1
P – Avoid telephone tag	20	8.9
P – More information; better prepared for return call	18	8.0
P – More efficient; frequent & better communication	18	8.0
In what specific applications or opportunities could voice messaging be especially useful?		
P – During travel, lunch, breaks, after hours	39	18.9
P – Avoid telephone tag	11	5.3
P – Especially good for departments with heavy phone use	11	5.3
How might voice messaging affect Company X's relationship with customers or agents?		
N – May create 'customer only a number' atmosphere	39	19.2
P – Customer relations improved; better contact	15	7.2
P – Positive impacts	10	4.8
M – Impersonal, but efficient	9	4.3
P – Avoid telephone tag	8	3.8
M – Good tool but not for everybody	8	3.8
What did you like best about using voice messaging?		
P – More information; better prepared for return call	20	9.0
P – Convenient, easy to use	19	8.6
P – Avoid telephone tag	14	6.3
P – During travel, lunch, breaks, after hours	14	6.3
P – Accuracy of message improved	13	5.9
P – More efficient; frequent & better communication	11	5.0
P – Having 24-hour access	11	5.0
P – Higher rate of answered calls	8	3.6
What did you like least about using messaging:		
N – Time lag to get into the system; slow response	29	14.2
R – Flashing light wanted to signify message	13	6.4
N – May create 'customer only a number' atmosphere	12	5.5
N – Impersonal — uncomfortable to use	11	5.4
N – Too many numbers required to access system	11	5.4

P = positive comment; N = negative comment; M = mixed comment; R = request.

The most common response to whether VM has changed the way one communicates with others was "no effect" (20%). The next most frequent responses had to do with overcoming temporal, spatial and interaction constraints in the form of avoiding telephone tag and being better able to respond to a return call. The three most frequent specific responses concerning what applications VM was especially useful for, had to do largely with reduction of constraints. VM was seen as most useful in reducing temporal constraints—when the two participants were not at their respective places at the same time, for understandable reasons such as during meetings, lunch, or outside working hours (19%). The most frequent responses to the question as to how VM might affect customer relations related to bandwidth attributes—the danger of creating an impersonal image of the company (19%). Indeed, some departments instituted a policy whereby voice answering could not be used for any external callers. On the other hand, some departments, such as Corporate Law, encouraged the use of VM for its outside clients because being able to communicate requests or answers was very important—they knew that their requests would be handled, or the answers routed. Other frequent responses noted that customer relations could in fact be improved by using voice mail, partially through overcoming constraints, and partially knowing how to manage the bandwidth attributes. These comments provide an explicit example of how the wider social and organizational context influences some of the consequences of identifiable attributes of new media. The exact same attribute may be evaluated positively or negatively, and encouraged or prohibited.

The aspects of VM that individuals liked best varied widely. The most frequent had to do with interaction, or the ability to consider one's reply before responding (9%). The other reasons mostly had to do with reducing constraints. Beswick and Reinsch, 1987, and Reinsch and Beswick, 1990, also found that overcoming time constraints between workers' shifts was the most positively rated advantage of, or reason for choosing, voice mail. Finally, aspects of VM that individuals liked least had primarily to do with the system interface, such as the "log-on" process (14%) and not knowing in advance whether there were VM messages waiting or not. The other categories of negative responses had to do with bandwidth issues such as the impersonal sense of the medium.

5.5. CONCLUSION

We have attempted to illustrate and explain ways in which electronic mail and voice mail can facilitate new forms of organizational communication. We have also attempted to clarify some concepts that may be new to the study of organizational telematics, and which may help researchers and practitioners alike understand these new forms. Interestingly, although there were many common uses of the two computer-mediated systems in the case studies, some

differences are also evident. For example, there does not appear to be the same degree of "broadcast" or "social" uses of voice mail as with electronic mail. Conversely, voice mail (at least voice answering) is far more accessible to employees and clients outside traditional organizational boundaries. Clearly, however, both media do enable forms of communication at work that were not feasible or possible in the past. The two cases were selected because of the rich usage environment they afforded. Indeed, they emphasize the changing and sometimes unexpected possibilities for communication via new media rather than typical or average uses in a wider population of organizations[18]. Further, whether these uses and new forms of communication will actually occur depends upon a wide variety of individual, managerial and organizational factors (such as, for example, the level of critical mass, the structuring of who can send messages to whom, and whether organizational policies allow the use of electronic and voice mail by external clients).

Any generalizations from our discussions and analyses are also limited by the fact that each study is based upon a single, for-profit organization in the United States. Large, private electronic and voice mail system are likely to be more prevalent in the United States for some time (though telephone companies are already offering voice mail services) than in other countries, where public PT&T ministries set standards and provide such services. On the other hand, such PT&Ts may be more likely to facilitate large-scale extra-organizational electronic mail or voice mail networks that may overcome more of the constraints, but perhaps also raise more issues concerning access to organizational communications.

Regardless of these qualifications, however, research on, and management of, new computer-mediated communication systems, must avoid the tendency to consider new media only as essentially substitutes for traditional communication channels, whether more efficient, effective, complex, formalizing, or the like. Rather, by incorporating new combinations of constraint, bandwidth, interaction, and network attributes, these new media may well significantly change how, and why, people in organizations communicate.

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[18] As is true of many studies of innovation in general, and new media in particular (Rice, 1988; Williams et al., 1988).

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