The Effects of Computer-Mediated Communication on Inter-departmental Relationships: Propositions for Research

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This paper examines the current research in computer-mediated communication and interdepartmental relationships. It uses these two areas to develop several propositions about the effects computer-mediated communication systems have on interdepartmental relationships in organizations. Generally, an examination of these two research areas leads to the conclusions that computer-mediated communication systems will increase communication links inside and outside organizations and also will increase the number of messages transmitted. In addition, communication flows between departments facing a high degree of task variety and task interdependence will show comparatively greater increases. Finally, these systems will be most useful in situations which do not require a high degree of personal interaction.

Advances in information technology have set the pace for tremendous growth in the use of computerized tools for communication, decision making, and problem solving in the organizational environment. The use of these computerized tools has the potential to reorganize the type of work people do across industries and organizational levels. Clerical personnel are being affected through the automation of routine manual activities such as filing, information retrieval, moving messages, and computational tasks; as well as through the implementation of word and data processing systems. In addition, computer conferencing, decision-support systems, simulation and modeling programs, electronic mail, and on-line management information systems are revolutionizing the ways managers perform their tasks (Zuboff 1982).

Traditionally, most organizational communication has taken place through face-to-face interaction, telephones, written memos, meetings, and formal reports. Innovations in computer technology, however, have led to the development of new computer-mediated channels of communication. A computer-mediated communication system is a generic term used to refer to a broad class of communication systems. This
class includes electronic mail, voice mail, computer conferencing, and computerized bulletin boards. Electronic mail refers to technologies which allow for the distribution of text-based messages between individuals and groups. Voice mail has many of the same capabilities as electronic mail, but differs in the fact that the sender’s voice is digitally recorded by the system for later replay. In this way, voice mail systems can be used as a type of answering service. Computer conferencing programs allow a group of users to share a data file from which they can read and add comments. Computerized bulletin boards are similar to computer conferencing with the exception that, whereas the latter is usually limited to those invited to discuss a specific subject, the former is public and general in nature (Steinfield 1986).

O’Reilly and Pondy (1979) offer a view of organizational communication in which the communications process is strongly constrained by the communication structure, which is formed of networks, communication directionality, information channels (including media), and roles. The communication structure is, in turn, an outcome of organizational variables such as formal organizational structure and information processing needs. As will be discussed later, the computer-mediated communication technologies mentioned above appear to have new capabilities which could alter dimensions of the communications structure as well as influence elements of the communication process.

Given this, the effect the above technical innovations will have on organizational communication networks is of interest to both researchers and practitioners. This topic is important because, among other things, the alteration of communication networks could have long-range effects on organizational efficiency and effectiveness (Huber 1982). Unfortunately, little research has been performed regarding the effects these computer-mediated systems have on interdepartmental communication. The goal of this paper is to examine the current research concerning computer-mediated communication, and utilize it to develop an insight into the effects computer-mediated communication may have on interdepartmental relationships. In addition, tentative propositions which may serve as a guide for future research will be presented.

**Computer-Mediated Communication**

Communication in organizations does not occur in a vacuum. A model developed by Sproull and Kiesler (1986) and pictured in Figure 1, shows that in each communication opportunity, there are social context cues present which influence an individual’s cognitive interpretation of the situation. This interpretation then influences both the communication behavior of the individual, as well as the type and quantity of information exchanged. The figure also identifies the three types of factors which can contribute significantly to social context: geographic, organizational, and situational.

Geographic factors limit communication through the difficulties encountered in transmitting over distances. Organizational factors such as position within the hierarchy and departmental affiliation may additionally constrain communication. Information is exchanged more often within departments than across. In addition, communication occurs more frequently among peers than across organizational strata. Situational factors, on the other hand, are those which define the norms or social conventions appropriate to the immediate situation. These norms and conventions influence what is appropriate to communicate, how equal the information exchange is, and who will initiate and lead the communication process.

People interpret the social context through static and dynamic cues. Static cues are those which arise from appearances or the environment. The size of a person’s office or their
personal appearance provide static cues to correct communication behavior. Dynamic cues are those nonverbal behaviors such as smiling or nodding one’s head which serve to regulate interaction (Sproull and Keisler 1986).

Any communication medium other than face-to-face lessens social context cues. Telephones, for example, while allowing people to communicate over geographic boundaries also filter out many static and dynamic cues available in face-to-face communication. Computer-mediated forms of communication lessen social context cues to a greater extent. Static cues are few and dynamic cues are almost totally eliminated.

**Effects of Computer-Mediated Communication**

The fact that computer-mediated communication systems lessen geographic and organizational barriers to communication has been borne out in many studies. Numerous researchers (Freeman 1980) (Hiltz and Turoff 1985) (Johansen and Spangler 1979) (Rice 1984) (Rice and Case 1983) have shown that the implementation of computer-mediated communication results in more links among organizational members as well as more messages being transmitted between those members.

In addition, computer-mediated communication has been shown to have an effect on the direction of communication. Rice and Case (Rice and Case 1983) found an increase in upward communication following the implementation of an electronic message system. Freeman and Freeman (Freeman and Freeman 1979), on the other hand, discovered an increase in both upward and downward communication when electronic messaging was introduced. Leduc (1979) states that as familiarity with a computer-mediated communication system increases, communication approaches an “all-channel structure, where everyone communicates with everyone else.”

It appears that, by filtering static cues to social context, computer-mediated communication systems remove barriers to communicating between organizational departments and across strata (Hiltz and Turoff 1985). Foster and Flynn (Foster and Flynn 1984) attribute increased communication links to a change in organizational protocol. Traditional hierarchical protocol inhibits an organizational member from stepping into the vice-president’s office for a chat. Computer-mediated communication, however, makes it possible to electronically “speak” to organizational members of different ranks and departmental affiliations without obviously violating this protocol.

It should be noted that the increase in
communication partners is not always desired by the recipients. Rice and Case (1983) found that the increase in both communication partners and messages associated with the introduction of a computer-mediated communication system resulted in information overload among the participants. This phenomenon, however, appears to be short-term in nature. It appears that as users gain familiarity with the system, they develop screening skills to prevent overload (Lawrence and Lorsch 1967).

Even though computer-mediated communication systems seem to increase the total number of communication partners, it does not appear to be appropriate for all communication purposes. The social presence of a medium, or the extent to which users discern that others are psychologically present when interacting, has been used to determine when applications of a medium are appropriate (Steinfield 1986). The theory of social presence postulates that users prefer high-bandwidth media affording greater social presence (face-to-face, video conferencing) when tasks involve interpersonal interaction. Since computer-mediated communication systems filter many dynamic and static social context cues, they are less satisfactory in communication activities which require high personal involvement and cooperation. Table 1, adapted from Rice (1980), summarizes existing research on appropriate and inappropriate applications of computer-mediated communication.

There is no guarantee, however, that organizational members will utilize computer-mediated communication media exclusively in appropriate communication activities. The ease with which messages can be sent via a computer-mediated communication system could lead individuals to utilize them for inappropriate applications. This could result in a decrease in the use of other media such as face-to-face, even when that medium would be more appropriate.

Summarizing the preceding research, there is evidence that suggests the implementation of a computer-mediated communication system may increase the number of communication links among organizational members as well as the number of messages sent between those members. The filtering of social context cues can lessen the inhibitions for communicating across organizational and hierarchical boundaries. In addition, computer-mediated communication seems less appropriate for tasks which require high personal involvement and cooperation.

### Table 1: Summary of existing research on appropriate and inappropriate applications of computer-mediated communication

<table>
<thead>
<tr>
<th>Appropriate Applications of Computer-mediated Communication</th>
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<tbody>
<tr>
<td>1. Exchanging technical information in short bursts</td>
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<tr>
<td>2. Asking questions</td>
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<tr>
<td>3. Exchanging opinions or orders</td>
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<tr>
<td>4. Staying in touch</td>
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<td>5. Generating ideas</td>
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<table>
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<tr>
<th>Inappropriate Applications of Computer-mediated Communication</th>
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</thead>
<tbody>
<tr>
<td>1. Bargaining</td>
</tr>
<tr>
<td>2. Resolving disagreements</td>
</tr>
<tr>
<td>3. Getting to know someone</td>
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<tr>
<td>4. Tasks requiring constant, focused discussion</td>
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Source: Rice, R.E., 1980

### Interdepartmental Relationships

Organizations are open social systems that process information in order to integrate internal functions and cope with environmental changes. These organizations are composed of subsystems or departments which are responsible for performing specific functions. Tasks performed by these departments may utilize specific technologies that differ from those of other departments. Effective organizational performance hinges on the effective performance and integration of these tasks (Daft and Lengel 1986).
Determinants of Interdepartmental Relationships

A basic function of organizational structure is to create the most efficient and appropriate configuration of work units. In fact, organizational information processing theory seeks to explain variations in organizational structure and behavior via associations with information requirements (Galbraith 1973).

Galbraith (1973), drawing on the work of Burns and Stalker (1961), Woodward (1964), Hall (1962), and Lawrence and Lorsch (1967), theorized that the observed variations in organizational structure could be related to the amount of information required to reduce task-related uncertainty. This reduction in uncertainty would allow the organization to achieve an acceptable level of performance.

A number of research studies and theoretical articles support this line of reasoning and identify factors leading to information flows. Several authors (Daft and MacIntosh 1981) (Randolph 1978) (Tushman 1979) (Van de Ven and Ferry 1980) have found support for a positive relationship between task variety and the quantity of information processed within a work unit. Van de Ven, Delbecq, and Koenig (1976) discovered that both high task variety and interdependence between departments are positively related to information flow. Others (Becker and Nicholas 1969) (Leavitt 1951) (Meissner 1969) have shown that either the amount or nature of information processing is associated with task-related uncertainty.

Daft and Lengel (1986) extend information processing theory further by proposing that organizations process information not only to reduce uncertainty, but also to reduce equivocality. While uncertainty means the absence of information, equivocality is defined as “the existence of multiple and conflicting interpretations about an organizational situation” (Daft and Lengel 1986). These authors identify task analyzability, departmental specialization, and the analyzability of cause-effect relationships in the environment as sources of equivocality.

This brief review has identified several factors which lead to a need for information flows between departments. Figure 2 presents a model which summarizes these relationships.

In the model, two factors are seen to lead to increases in uncertainty. Task variety, which is the frequency of unforeseen and novel events that occur in the transformation process, creates uncertainty due to the fact that participants cannot anticipate problems or activities in advance. Task interdependence, on the other hand, refers to the extent to which departments depend upon each other to accomplish their tasks. Uncertainty arises when one department is unaware of the other’s activities.

Three factors can be seen to contribute to equivocality. The first, task analyzability, is a function of task complexity and concerns the way individuals respond to problems. When work is analyzable, individuals utilize objective, computational procedures to solve problems. When work is unanalyzable, on the other hand, individuals cannot develop exact procedures...
and rely more on judgment and experience. Low task analyzability leads to high equivocality. Departmental differentiation exists when each department develops its own functional specialization, time horizon, goals, frame of reference, and jargon. Equivocality arises from the fact that these varying factors cause members of different departments to interpret the same data in different ways. Environmental cause-effect analyzability, the final factor, refers to the perceived analyzability of cause-effect relationships in the environment. When cause-effect relationships are thought to be unclear, high equivocality exists.

The presence of uncertainty and equivocality both create the need for interdepartmental information exchange; however, the structural mechanisms needed to reduce each differ. Daft and Lengel (1986) theorize that organizational structure, and therefore the type of coordination between departments, can be predicted by the need for uncertainty or ambiguity reduction between departments. The key to this line of reasoning is that uncertainty can be alleviated by structural mechanisms which increase the amount of information, while equivocality can only be reduced through structural mechanisms which facilitate the processing of rich information.

In this case, rich information flows are defined as those which “can overcome different frames of reference or clarify ambiguous issues to change understanding in a timely manner” (Daft and Lengel 1986). When uncertainty reduction is needed, structural mechanisms such as rules and regulations, formal information systems, and special reports are indicated. These media are less rich and facilitate the transfer of large quantities of information. Conversely, when equivocality reduction is the concern, structural mechanisms which allow the exchange of rich information such as direct contact (face-to-face), integrators (liaisons), or group meetings are necessary. Figure 3, from Daft and Lengel (1986), depicts the information role of structural characteristics for reducing equivocality or uncertainty.

The model presented in Figure 3 serves to illuminate situations in which computer-mediated communication could be most effectively used in organizations. It is evident that organizations use different types of coordination mechanisms to deal with uncertainty and equivocality. The reduction of uncertainty requires coordination mechanisms which facilitate the transfer of less rich information, while equivocality reduction requires mechanisms

![Figure 3: Information role of structural characteristics for reducing equivocality or uncertainty](image-url)
which allow the transfer of rich information.

Rice (1980) states that computer-mediated communication is appropriate for information gathering activities such as exchanging technical information, asking questions, and staying in touch. These are activities which require less rich communication media. Computer-mediated communication, therefore, would seem to be uniquely suited for use as a coordination mechanism between departments which face uncertainty.

Equivocal situations, on the other hand, would appear to be ill-suited to computer-mediated communication. Usually equivocal situations require bargaining or constant, focused discussions. Rice (1980) states that in these situations more personal methods of coordination such as face-to-face communication were necessary. However, computer-mediated communication could be used prior to more personal methods of coordination. Items such as agendas and important points could be communicated prior to a meeting or face-to-face discussion. In this way, time will not be wasted exchanging information which does not require the “rich” personal methods of communication.

In summary, it is expected that communication flows will be greater between departments which face high task variety, high task interdependence, low task analyzability, high departmental differentiation, and low cause-effect analyzability. In addition, in situations of uncertainty such as those relating to task variety and interdependence, computer-mediated communication will be utilized as a coordination mechanism.

Integration and Formulation of Research Propositions

In merging these two streams of research in order to develop an insight into the effects of computer-mediated communication on interdepartmental relationships, it is helpful to view organizations as a complex network of communication links. A mapping of communication interaction within organizations can be achieved using network analysis.

Network analysis is a method of identifying communication structure in an organization (Rogers and Agarwala-Rogers 1976). Network analysis models specific communication flows in the organization and defines the organizational structure by these flows. Rogers and Agarwala-Rogers (1976) state that network analysis serves the purpose of:

1. Identifying cliques within the organization and determining their communication patterns. Cliques are composed of organizational members who communicate with each other more frequently than with other organizational members.

2. Identifying certain specialized communication roles such as liaisons, bridges, and isolates. These roles are defined in Figure 4.

3. Measuring structural indexes such as connectedness for the organizational members, groups, or the entire organization. In defining connectedness, clique connectedness and organizational connectedness must be considered. Clique connectedness is the degree to which members of a clique are linked with each other by communication flows. The actual degree of connectedness among the individuals in a clique can be compared to the total possible degree of connectedness to obtain a connectedness index. Organizational connectedness is the degree to which the cliques in an organization are linked to each other by communication flows.

Organizational Network

As alluded to above and seen in Figure 4, members of organizations can assume several distinct network roles. These roles include the group members of cliques, liaisons, bridge links, isolates, and gatekeepers. In traditional hierarchical organizations, bridge links and liaisons have usually been people in positions of power,
such as departmental and divisional managers. Departments can be viewed as formal cliques. Communication between departments, therefore, has been mostly through the formal channel of departmental and divisional managers with little direct interaction between group members of different departments. The implementation of a computer-mediated communication system, which makes communication between any two organizational members relatively easy, should affect these network arrangements considerably.

With the implementation of computer-mediated communication, it is expected that members will increase their overall number of communication partners, both inside and outside the department. Studies (Freeman 1980) (Foster and Flynn 1984) have indicated that the total number of messages sent between these partners will also increase. In effect, each departmental member will become a bridge link to other departments. This presents the possibility that group members could become less dependent on their managers and co-workers within their department for information, thus threatening to undermine the traditional hierarchical power structure. These observations lead to our first three propositions:

P1: The implementation of computer-mediated communication systems will result in an increase in the degree of organizational communication network connectedness.

P2: The implementation of computer-mediated communication systems will result in an increase in the overall degree of intradepartmental or clique communication network connectedness.

P3: The implementation of computer-mediated communication systems will result in an increase in the overall number of interdepartmental and intradepartmental messages transmitted.

While very few departmental managers
would drop in for a face-to-face talk with their manager’s manager, the impersonal nature of computer-mediated communication increases the likelihood that communication will occur across these hierarchical boundaries. In addition, if this non-traditional form of communication is accepted as an appropriate medium, the ease with which higher level managers can generate, copy, and distribute messages to various organizational members will increase the frequency of downward communication.

Since computer-mediated communication appears to remove barriers to communicating across hierarchical strata, it is anticipated that increased upward and downward communication will occur within organizations. This could result in the elimination of many intermediate liaisons and bridge links. In organizations this could result in the elimination of many middle management positions, since their primary purpose is the interpretation, summarization, modification, and exchange of information between organizational levels. This line of reasoning leads to the following proposition:

P4: The implementation of computer-mediated communication systems will result in an increase in the number of messages transmitted across organizational hierarchical strata.

As stated earlier, studies have shown that communication flows are greater between departments which face high degrees of task-related uncertainty and equivocality. This uncertainty and equivocality has traditionally been diminished through communication between departmental managers who serve as interdepartmental liaisons. The implementation of computer-mediated communication systems, which have been identified as being suited for the exchange of less rich information, have the potential to alter the coordination mechanism utilized in uncertain situations. In such situations, computer-mediated communication systems may make it possible for departmental members to acquire the needed information directly from members of other departments.

It is not expected, however, that computer-mediated communication systems will be utilized as a coordination mechanism between departments which face equivocality. Equivo-cal situations require constant, focused discussion which a computer-mediated communication system is ill-equipped to handle. The preceding discussion leads to the following two propositions:

P5: Computer-mediated communication systems will be used primarily as coordination mechanism between departments which face high amounts of task-related uncertainty.

P6: Computer-mediated communication systems will not be used as a coordination mechanism between departments which face high amounts of task-related equivocality.

The ability of department members to gather information directly from members of other departments should facilitate the formation of task-related work groups, or informal cliques. These task-related work groups could blur the boundaries between departments. Since organizational structure is but a formal representation of communication networks, these task groups have the capacity to change organizational structure. This leads to the last proposition:

P7: The implementation of computer-mediated communication systems will lead to the formation of informal cliques or informal task-related work groups which will cut across formal departmental lines.
Summary

The goal of this paper was to examine the current research concerning both computer-mediated communication and interdepartmental relationships and utilize them to develop an insight into the effects computer-mediated communication has on interdepartmental relationships.

The research on computer-mediated communication provides evidence to suggest that the implementation of such a system may increase the number of communication links among organizational members and the number of messages sent between those members. Furthermore, the filtering of social context cues appears to lessen the inhibitions for communicating across organizational and hierarchical boundaries. Computer-mediated communication has also been shown to be less appropriate for tasks which require high personal involvement and cooperation.

Organizational research provides evidence suggesting that communication flows will be greater between those departments which face a high degree of task variety and task interdependence. In addition, in situations of uncertainty, impersonal methods of coordination will be utilized, while equivocal situations will require more personal methods of coordination.

The examination of these two streams of research leads to the inference that the implementation of a computer-mediated communication system will lead to more overall links both within and outside departments, an increase in the number of horizontal communication contacts, and an increase in the number of messages transmitted between departments and organizational strata. In addition, communication flows between departments facing a high degree of task variety and task interdependence should show comparatively greater increases. Lastly, computer-mediated communication should be utilized in situations which do not require a high degree of personal involvement and interaction.

Research into these propositions is important due to the fact that computer-mediated communication systems have the potential to alter interdepartmental communication networks and through it, efficiency and organizational structure. Increases in the number of interdepartmental links can increase efficiency, but also reduce the reliance on departmental managers for information and threaten to undermine the traditional hierarchical power structure. Increasing the ease with which members can communicate across hierarchical strata also can increase efficiency. The result could be the elimination of many middle management positions. Executives in organizations will face these and other changes due to the influx of computer-mediated communication systems. They must have knowledge to manage these changes and such knowledge may be derived through research on this important topic.

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