New information technologies and informality: comparing organizational information flows using the CSM

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Abstract: Information flows are exceedingly contingent, situation-bound, and dependent on the perceptions and complex relationships among the people involved. Yet, historically, analysts have characterized organizational information flows in simple dichotomous terms: task vs. social, downward vs. upward, message vs. feedback, routine vs. innovative. One of the most durable of these dichotomies has been 'formal' vs. 'informal'. Although these terms are sometimes used to denote the style of the message or its organizational origins, most of the time information exchange is considered formal or informal depending on which channels are used. 'Formal' exchanges employ documented information that is distributed in a one-way, hierarchical manner. 'Informal' exchanges involve interpersonal interactions that leave little or no permanent record (e.g., face-to-face or telephone conversations).

In this paper we argue that the notion of formal vs. informal information flows is not just a matter of channel or technology choice. Information exhange can be better understood in terms of how individuals perceive six key factors or elements of the Communication Situations Model (CSM), a framework for analyzing and understanding communication in technology-intensive environments and the corresponding patterns of information flows in those contexts. The main elements of the CSM are described (culture, relationships, content, temporality, involvement, and control), and 'formal' and 'informal' information flows are compared in terms of all six factors. The paper concludes with a discussion of the implications of increased reliance on new information technologies in organizations, and of the trend toward informal styles of information exchange that characterizes such information environments.

Keywords: Information technology; communication in organizations; organizational behavior; telematics

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Introduction [1]

When people in organizations exchange information, they typically frame their interactions in whatever way seems most appropriate, given the ideas they want to share, the people they wish to contact, the mix of information technologies or channels that are available, and any other situational factors that seem relevant to them, such as cost, time, and so forth. Information flows are exceedingly contingent, situation-bound, and dependent on the perceptions and complex relationships among the people involved.

Yet, analysts have historically characterized organizational information flows in simple dichotomous terms: task vs. social, downward vs. upward, message vs. feedback, routine vs. innovative [2]. One of the most durable of these dichotomies has been 'formal' vs. 'informal' [3]. Although these terms are sometimes used to denote the style of the message or its organizational origins, information exchange is usually considered formal or informal depending on which channels are used. 'Formal' exchanges employ printed materials, meeting agendas, or other documented information that is distributed in a one-way, hierarchical manner. 'Informal' exchanges, on the other hand, tend to be unplanned interpersonal interactions that leave little or no permanent record (for example, face-to-face or telephone conversations).

The 'formal/informal' distinction, then, has grown out of the parallel distinction between mediated and interpersonal interaction [4]. Face-to-face contact is often considered the ideal form of information exchange in organizations, especially for complex or ambiguous information [5]. This assumption has been the cornerstone of 40 years of organizational communication studies [6] and is embodied explicitly in some theories of information technology use in organizations, such as 'media richness' or 'media choice' theory [8]. Various media are evaluated and used according to how closely they can approximate or simulate the face-to-face experience. In an earlier article,

the authors have referred to this assumption as the "bias toward maximizing channels" [9]. Indeed, organizational communication research has been dominated by what Danowski calls the 'face-to-face bias', treating media and other information technologies as 'transparent' or unproblematic [10].

However, the introduction and widespread adoption of new information technologies in organizations (for example, fax, electronic mail, pagers, overnight delivery services, voice mail, teleconferencing, and online information services) has substantially changed the meaning and use of formal versus informal information flows. An apparently paradoxical situation has developed in which many types of information exchange have become both more informal *and* more documentable. Formal/informal is no longer merely a function of which channel or technology is used (especially since many kinds of information exchange employ multiple channels and technologies simultaneously). Formality is, in fact, an emergent and fluid quality of all kinds of information exchange arising from the participants' changing perceptions of the total information environment at any given point in time or space [11]. The new communication and information technologies seem to foster informal styles of interaction, whether the exchange is face-to-face or not. This trend toward informality has several potential organizational implications that are discussed below.

In this paper it is argued that the notion of formal vs. informal information exchange can be better understood in terms of how individuals perceive six key factors in their informational/organizational environments: the temporality of information exchange; their involvement in the exchange; their degree of control in the situation; the content of the information being shared, which is determined by the relationships among participants, which in turn are influenced by the culture of the organization. Together, these six factors comprise the main elements of the Communication Situations Model, or CSM [12], a framework for analyzing and understanding communication in technology-intensive environments and the corresponding patterns of information flows in those contexts. In this paper, the main elements of the CSM are described. Formal and informal information flows are compared, not just in terms of channels used, but in terms of all the factors in the CSM, to see how formal and informal flows might differ. The paper concludes with a brief discussion of some possible implications of increased reliance on new information technologies in organizations, and of the trend toward informal styles of information exchange that arise in environments saturated with information technologies.

Elements of the CSM

To explain the CSM, we begin with some basic definitions. *Communication* is human behavior that facilitates the sharing of meaning, which takes place in a particular social context. It occurs in *communication situations*, episodes or instances of the *information environment*, the whole fabric of social relations and available technology that enable a person to engage with others or to seek and use information as he/she wishes. When people combine particular social and technological resources from the environment for particular communicative or information exchange purposes, that special combination is a *communication system*. Some systems become established features of the information environment (for example, the use of fax machines or messengers). People draw on resources and engage in information exchanges or interactions on a situation-by-situation basis, in response to their own individual problems, needs, or experiences.

As these definitions suggest, communication situations are not simply either 'interpersonal' or 'mediated'. They involve whatever resources and behavior the people involved perceive as necessary or desirable to achieve their ends. This perspective, therefore, challenges several of the implicit assumptions that typify many studies of information technology use in organizations. In particular, it challenges the assumption that face-to-face communication is the most effective form of communication in most if not all situations, especially for complex (equivocal) information. Consequently, it challenges the assumption that bigger is better when it comes to bandwidth; that is, individuals should want to maximize bandwidth in their communication. This assumption presumes that if face-to-face communication is not possible, the next best thing is using multiple channels (video and audio and text, for example) to simulate the effect and 'feel' of face-to-face communication as closely as possible. In turn, this assumption suggests that individuals select communication systems rationally and efficiently: that is, they choose the 'right' system for the 'right' type of communication, using a kind of cost-effectiveness criterion [13].

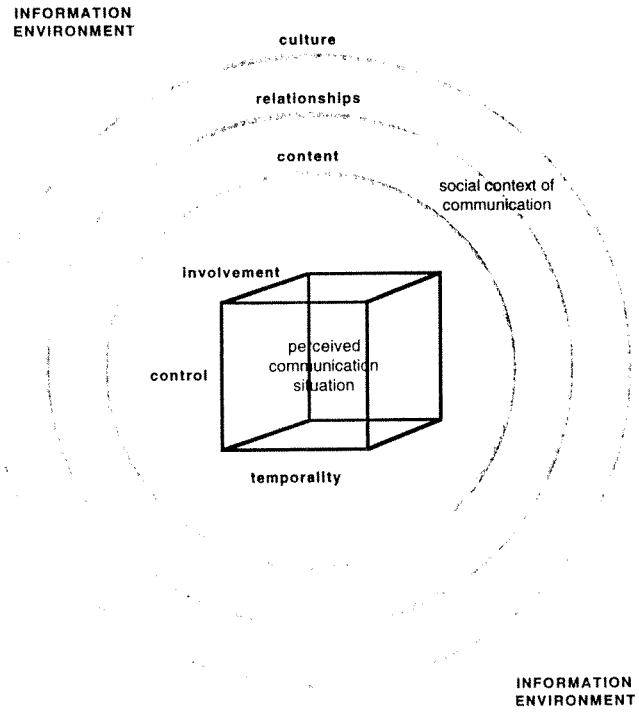
Such assumptions reflect historical and political tendencies in particular organizations rather than any inherent qualities of communication behavior or information technologies themselves. The assumptions also tend to obscure the similarities between interpersonal (considered informal) and mediated (formal) communication. In contrast, the CSM assumes that communicators employ a wide repetoire of communication practices in highly idiosyncratic, non-rational and personal mixes, according to the varying situations in which they find themselves [14].

In the CSM framework, communication situations have two main levels – the broader social context level and the narrower interaction experience level – surrounded by the greater information environment. The social context of information exchange is composed of three progressively more comprehensive elements (see Figure 1):

- the content of the communication or information exchange itself (the specific message or meaning to be shared);
- the specific interpersonal relationships among the communicators who are sharing such meaning, which may pertain variously to their work tasks, their personal affiliations, or a combination of the two; and
- the culture within which the communicators interact, which permits or prohibits certain kinds of relationships and content.

Each layer of social context, from culture to content, affects the next: that is, the culture tends to influence the types of relationships that are permitted and what types of behavior are appropriate in them. Likewise, the nature of relationships tends to influence what kinds of content are concerned. For example, in American workplaces, the prevailing culture generally recognizes that people working together are often in superior-subordinate relationships. In such relationships it is appropriate for the superior, but not the subordinate, to specify what work tasks are to be performed and in what ways.

Figure 1 Schematic illustration of communication situations model



The next three elements of the CSM relate to the interaction or information exchange itself as it is perceived by participants. The CSM proposes that people experience interactions in terms of three main dimensions:

- temporality – the experience of time in a given communication situation (includes constructs like simultaneity and the duration of communication);
- involvement – the degree to which communicators employ cognitive, affective, and/or sensory capabilities in a given communication situation (the most complex dimension, and includes the perception of physical space and psychological distance) [15]; and
- control – the degree to which communicators can exert influence in a given communication situation (incorporates both the sense of how much influence can be exercised, and the symmetry of influence).

There is an extensive literature that documents the dimensional qualities of communication in a technologically sophisticated environment, and a wide range of candidates have been proposed as meaningful dimensions of the experience [16]. However, in our view, temporality, involvement and control crystallize the essential attributes of information exchange, providing the most parsimonious scheme for understanding and comparing various kinds of interaction [17].

The dimensions are not simple, unified constructs; rather, each encompasses several related concepts and processes. An individual's perception of control in a communication situation, for example, might relate to the people involved, the communication media involved, to the social or physical setting involved, his or her own capacity to influence the situation, or all of these and more.

Furthermore, each dimension has a range of values. While these ranges are probably not strictly proportional, we nonetheless believe that situations can be characterized according to differing degrees of the dimensions that individuals perceive. For example, the temporality dimension might be operationalized as a range of values from simultaneous to non-simultaneous, or from brief duration to extended duration. The control dimension might range from low to high control, or from sender control, to shared control, to receiver control. The involvement dimension, the most complex of the three, might range along many values of emotional strength, cognitive difficulty, or physical skill or aptitude (or various combinations). Therefore, a communication situation might be perceived by an individual as a shared-control, low-temporality, high-involvement situation.

Social context (content, relationships and culture) is important in the CSM because it links each information exchange experience (perceived in terms of temporality, involvement and control) with the larger information environment. The environment provides resources that shape communicators' perceptions. If the environment does not provide certain cultural resources, for all intents and purposes those resources are non-existent for a given exchange and, by extension, for the whole communication situation. For example, if an organization (such as a hospital or clinic, for instance) operates in a bilingual community, the kinds of resources available to people working in that context are different from the ones available if only one language is spoken.

Social context is in a real sense a filter between individual perception and the larger information environment. As such, it directs or mediates the availability of resources from the environment to individuals, and by the same token diffuses people's perceptions back into the environment. The net result is that communication is not merely channel-driven, but rather reflects the co-determining relationship between environmental resources and individual perceptions via the medium of social context.

We have developed a simple convention for illustrating the CSM, depicting the three dimensions, the interaction experience, in the form of a cube placed within three nested spheres representing the three elements of social context, surrounded by the information environment (see Figure 1) [18]. The cube suggests the interdependence of the temporality, involvement and control dimensions, and the nested spheres suggest the corresponding nestedness of content within relationships, which in turn are nested within culture. The cube represents the experience of interaction, situated within and driven by the social context. Information resources are drawn in from the environment through the layers of social context to the nexus of individual perception in the communication situation; and perceptions may in turn diffuse outward through the social context and thus into the information environment.

Hypothetically, a given communication situation can be portrayed using the Figure, depending on how it is experienced and perceived by the people involved [19]. Also, different participants might characterize the same communication situation differently, and represent their perception of the experience differently in the Figure, placing it along the temporality, involvement and control dimensions and relative to the layers of social

context. The model is intended to provide a general and abstract framework for comparing different communication situations, based on the perceived or experienced similarities or differences in certain qualities of the communication or information exchange activities in them. The objective is not simply to categorize technologies according to their technical features (for example, still vs. motion, the number of people reached by a particular channel, sound vs. visual).

Comparing formal vs. informal information flows

We now turn to formality and informality *vis a vis* the six elements of the CSM, which act as indicators of the constantly changing nature of information flows in the organizational setting. While the following examples are somewhat simplified, they can nonetheless be considered ideal types or models of the principles being discussed. Formality (or informality) is framed by the prevailing culture of the organization in question. Studies of organizational culture have demonstrated that certain organizations are marked by rule-bound and relatively rigid modes of superior-subordinate relations, decision-making procedures, expectations about employee behavior and roles, and public presentation of the organization's image or style [20]. Such organizations can be characterized as more formal. On the other hand, some organizations are more flexible about these aspects of organizational life, and can be considered more informal. In both cases, we would expect the organizations' cultural predispositions to be reflected in their members' information exchange styles. For example, we would expect the culture of an established investment banking firm to differ considerably from that of a small high-technology research and development group, and to be expressed differently in the behavior of people working in each setting. Accordingly, in different organizational cultures some types of relationships are permitted, while others are not. For example, some firms may segregate employee contact fairly strictly, based on organizational level or span of control or supervision. Top management and production personnel may have very few opportunities to interact. In other organizations, on the other hand, such contact might be considered essential and actively encouraged.

By the same token, relationships tend to constrain the content of employees' information exchanges. Strictly segregated employee groups, levels or roles may exchange only very general and impersonal information, while closer relationships can convey rapidly changing or equivocal task information, speculation or opinions about the work being done, or interpersonal information that helps to reinforce employee socialization. Some kinds of content may be specifically prohibited in certain relationships (for instance, so-called 'trade secrets' that may not be discussed with employees outside a particular unit or department; financial information that may not be shared with employees who might exploit such information inappropriately; sexually explicit or harassing conversation between men and women employees may be prohibited). On the other hand, an organization with an actively informal culture, one that encourages contact among and across all its members, may have a correspondingly open attitude about employees sharing all kinds of information, whether about work, non-work, or personal issues.

Culture, relationships, and content – which comprise the social context of the organization – are normally the most stable aspects of the model with regard to information flows. Referring back to Figure 1, the three concentric shells serve as a fairly consistent matrix for episodic individual interactions. In one sense, culture, relationships

and content are the more macro elements influencing information flows, since they transcend individual experience and exist more or less consistently over the life of the organization. The remaining three elements – temporality, involvement, and control – affect information flows at the micro level of the particular exchange.

To illustrate the three dimensions of experience, we can consider a single interaction in an informal, open organization. For example, a software designer is trying to meet a release deadline for a new software package. She needs extra information about the package's target consumers, and decides to call a close friend who is working on the marketing plan for the same package in another department, instead of sending a message to her supervisor via e-mail or reviewing the description of audience demographics included in the original project proposal. We might infer that the designer has perceived her situation in certain ways and so has engaged in a certain type of information exchange.

First, in terms of temporality, she may perceive that her time is limited and that her friend can give her a quicker answer than either her supervisor or the proposal material can provide. In terms of involvement, she may have more affinity with her co-worker than she has with her supervisor (or, we can assume, the proposal). The informal phone call may allow more cognitive involvement because she can query her friend for clarifications or speculations about the target group. In terms of control, the designer may feel that she has more control (or can share control more evenly) with her co-worker than she has with her supervisor. In sum, she has elected to exchange information this way because it affords her the degree of control, involvement in the situation, and expediency she wants.

Moreover, she has elected this approach because the social context of her organization – its informal culture, her friendship with a co-worker, and the personal style of information they can share – has led her to have certain expectations about her work-related interactions, and has provided her with various resources to draw upon. In turn, her communicative actions over time (combined with those of all her co-workers) will have a ripple effect through the social context, and may eventually affect the information environment.

To use another example from a more formal organizational context, a manager in a large manufacturing firm may need to establish a new production procedure, based on changes in environmental laws that he has been advised about by the firm's legal staff. He decides to send all manufacturing supervisors a memo describing the change and directing its implementation, rather than hold a meeting with the supervisors to explain the new procedure. We may conclude that the manager wants the change made quickly (temporality), and to make sure that the new procedure is described consistently and unambiguously to every supervisor in the same manner (control of the message). He may want to signal his personal distance (lack of cognitive or affective involvement) from the decision by simply relaying orders from a higher level about an externally-imposed regulation; and he may want to control the interpersonal situation by conveying the information in a form that limits feedback. Again, the culture of this organization apparently allows the manager to communicate in a top-down manner, reinforcing the relationship he has with the supervisors and their subordinates, and keeping the content of the communication limited to task-related information. His perceptions and behavior will help reinforce or change the larger information environment as they are filtered through the layers of social context.

Each of these scenarios depends on how it is viewed by the participants in it, and might well be played out differently if different individuals were involved. But as we have seen, it would be difficult to categorize the first scenario as informal merely because it involves a telephone conversation, or the second as formal because a memorandum was distributed. Indeed, the second scenario might have evolved entirely differently had it occurred in the first organization, and vice versa. Instead, we can see that a web of interacting factors comes into play at the point of each interaction or exchange, leading to a wide range of possible types of information flow.

Discussion: information technologies, informality, and organizational information flows

Up to this point it has been argued that organizational information flows are highly contingent. They depend on the technological and social resources available in the information environment; the cultural, relational, and content aspects of the organization's social context; and the perceptions of the participants who engage in information exchange. The environment and perceptions are constantly co-determining via the filter of social context. The CSM has been offered as a framework for integrating these various elements and for comparing different information flows.

Now we turn to a series of hypothetical propositions:

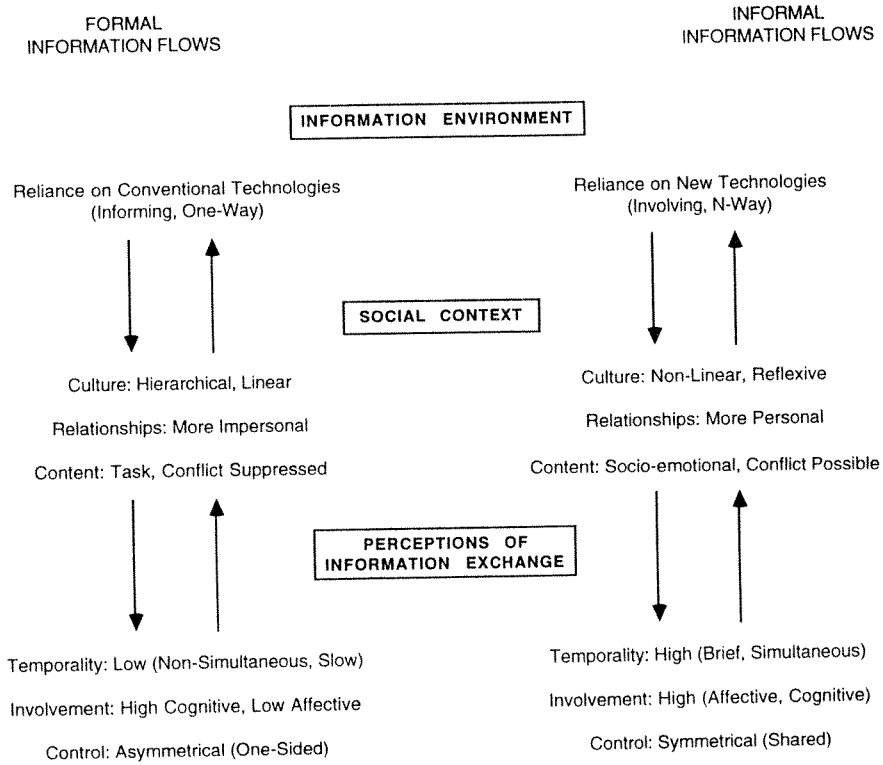
- organizations adopt certain information technologies – they modify their information environments – because such technologies most closely reflect and support the perceptions and interaction patterns of people in the organization;
- as an organization relies to a greater extent on information technologies, the new technology-intensive environment fosters a more informal social context; and
- in turn, the informal social context is reflected in the changed perceptions of individuals involved in interactions.

Stated differently, a 'loop' is created: organizations change their information environments in response to employee communication needs/perceptions; the more an organization depends on new information technologies for its information exchanges, the more informal its social context becomes; and therefore the more likely its members are to perceive information exchanges as low-temporality (both in terms of brief duration and increased simultaneity), high-involvement (especially in terms of being personal), and more symmetrical or balanced in terms of control (see Figure 2).

We characterize this loop as the trend toward informality associated with new information technologies. It suggests that information flows in technology-intensive environments will tend to be less formal than flows in organizations that depend on more traditional channels of information. Table 1 summarizes some of the differences between the two types of information environments. Generally, we can say that conventional technology environments can be considered informing (one-way, directive, tightly structured), while new technology environments are involving (multi-way, interactive, loosely structured). The conventional technology, or informing information environment, encourages a social context where the culture reflects the linear, one-way nature of the interactions in the organization, and of the technologies that are used. Therefore, the relationships in it will tend to be impersonal, and the content of interaction will tend to be

more task oriented. Conversely, the new technology, or involving environment, fosters a culture that is more non-linear, reflexive, and participatory, relationships that are more personal, and content that is more personal or social.

Figure 2 Loop of relations among information environment, social context, and perception of interactions



Recent empirical research, in fact, supports these differences. New technologies (especially computer-mediated communication technologies) have been shown to have a disinhibiting effect on user interactions [21]. They also tend to diminish the perceived status differences between users [22]. Users find that such technologies as electronic mail are as useful for sharing socio-emotional information as for task-related information [23]. These effects were seen initially with the telephone, although perhaps to a lesser degree [24]. The research findings are consistent with current concerns about e-mail 'flaming', for example, or the perceived cultural divide between traditional (academic and research) users of the Internet and newcomer business users, who are often seen as interlopers and spoilers of a non-commercial information environment. The information superhighway today is contested territory, not least because while it has developed and flourished as an informal information exchange arena, some new users want to impose rules, network structures, and content forms that would effectively formalize it – that is, make it feel

more like traditional information sources such as print or broadcasting.

Table 1 Characteristics of organizational information environments relying on conventional vs. new information technologies

	Information Environments	
	INFORMING (Conventional Information Technologies)	*INVOLVING (New Information Technologies)*
Characteristics		
Dominant systems	Mass, one-way, informative (e.g., print, broadcast)	'Demassified', n-way, conversational (e.g., fax, voice mail, e-mail)
Fundamental technology	Transmission	Switching
Distribution pattern	Broad audience	Narrow targeted groups or individuals
Messages	Reflect consensus/management views: argument/conflict controlled or suppressed	Reflect diverse employee views: argument/conflict likely
Gatekeeping approach	Institutional: agenda-setting, 'spin control' by supervisory staff	Interpersonal: codes of etiquette, conflict mediated through interaction among all staff members
Knowledge base	Tradition, routine, existing solutions	Innovation, creative solutions
Principal technology uses	Access to existing info sources, consumption of information	Creation of new info sources, providing information
Power implications	Stabilizing	Destabilizing
Decision-making pattern	Centralized	Decentralized

The changing information environment and corresponding trend toward informality suggest several implications for organizational information flows.

- In the new technology environment, individuals are more credible and valued sources of information than are institutional or organizational sources. Individuals can be queried, conversed with, challenged, or critiqued, as more formal (documentary) sources cannot be. This may have important implications for management styles, especially management communication effectiveness, as employees seek information from individuals rather than documents or offices.
- The symmetry of control over information flows afforded by the new information technologies may lead to more decentralized or distributed forms of decision-making. This impact is seen in the fact that many organizations attempt to retain old patterns of control by building technological (software) barriers to lateral or bottom-up communication in their e-mail systems, for example. Whether such strategies can be successful or even maintained over the long term is an open question as prevailing expectations among workers about communication patterns eventually reflect the flexibility and choice of everyday media.
- The involving information environment and corresponding informality may create an atmosphere in some organizations that is conducive to creativity and innovation. This may be a key to productivity in research and development groups or other knowledge-creating organizations, for example, but may be seriously destabilizing in organizations doing routine work.
- New patterns of collaborative work may emerge since new technologies have the capacity to eliminate the need for physical proximity for some kinds of work. Collaboration may come to span not only physical distance, but even institutional or national/cultural boundaries. Organizations with a stake in international or global projects often find new technologies particularly useful. However, cross-cultural flows may present special challenges, especially where norms differ between cultures in appropriate levels and forms of interaction.
- Informality may lead to more expression of disagreement or even outright conflict, which might otherwise have been masked or suppressed in more formal circumstances. Again, this may pose a special problem for management as some amount of conflict may be desirable for organizational growth, change, and development, while too much, or the wrong kind, of conflict may be destructive.

Conclusion

We have attempted to formulate a way of thinking about information flows in organizations, especially those that rely extensively on new information technologies. Information flows, we suggest, are not simply the products of which message is conveyed by which channel. Instead, they are characterized by the constantly changing and emergent qualities of many aspects of the organization's information environment, social context, and individual members' perceptions. Information flows are formal or informal depending on whatever particular combination of these elements come together at a particular point in time and space.

We have also argued that new information technologies have altered the information environment of many organizations, notably in terms of a trend toward informality. Accordingly, there are several implications for information flows in communication situations in a technology-intensive information environment and an informal social context. Flows are more personalized; they reflect more distributed patterns of organizational control; they foster innovativeness/creativity (and negatively, organizational instability); they foster more widespread patterns of collaborative work; and they are marked by increased levels of disagreement or conflict. Managers should understand these complex interacting factors in order successfully to guide information flows in their organizations.

References and Notes

1 Earlier versions of some of the material in this paper were presented in papers given at the 39th annual meeting of the International Communication Association, San Francisco, CA, May 1989, and the 43rd annual meeting of the International Communication Association, Washington, D.C., May 27–31, 1993.

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11 We assume that the information environment includes both interpersonal networks that facilitate task and social relations in the organization, and also the various technology networks that are available to support those relations.

12 Lievrouw and Finn, *op.cit.*; idem, *The Communication Situations Model: Framework and Pilot Study*, unpublished manuscript, University of Alabama, Tuscaloosa, AL, 1993, available from the first author. In an earlier paper (Lievrouw and Finn, 1990, *op.cit.*), we called our framework the Communication Systems Model, because we defined a communication system as any interacting set of social and technological circumstances which facilitates the sharing of meaning among people. Despite this position, however, we found that the original name led several readers mistakenly to characterize the model as a way of classifying media systems or technologies. This is not the case: our main concern is the total circumstance or experience of communication, not just of 'media'. Therefore, we have changed the name to the Communication *Situations* Model to clarify and re-establish the purpose of our approach.

13 For a classic critique of rationality in organizational studies, see Argyris, C., 'Management information systems: the challenge to rationality and emotionality,' *Management Science*, 17, 1971, pp. B275–B292.

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15 Related constructs include social presence (Short, J., Williams, E., and Christie, B., *The Social Psychology of Telecommunications*, John Wiley and Sons, London and New York, 1976; propinquity (Korzenny, F., and Bauer, C., 'Testing the theory of electronic propinquity,' *Communication Research*, 8, 4, 1981, pp. 479–98); bandwidth; media or information richness (Trevino, Daft and Lengel, *op.cit.*; Schmitz and Fulk, *op.cit.*; proximity; distance; disinhibition (Sproull, L.S., and Kiesler, S., 'Reducing social context cues: electronic mail in organizational communication,' *Management Science*, 32, 11, 1986, pp. 1492–512); system transparency; enmeshment (Pearce, W.B., and Cronen, V.E., *Communication, Action and Meaning: The Creation of Social Realities*, Praeger, New York, NY, 1980); and immediacy (Mehrabian, A., 'Immediacy: an indicator of attitudes in linguistic communication,' *Journal of Personality*, 34, 1966, pp. 26–34, and Mehrabian, A., *Silent Messages*, Wadsworth, Belmont, CA, 1971). The cognitive, affective, and behavioral facets of involvement in communication reflect the traditional taxonomy of human psychology.

16 Culnan, M.J., 'The dimensions of perceived accessibility to information: implications for the delivery of information systems and services,' *Journal of the American Society for Information Science*, 36, 5, 1985, pp. 302–8; Hurt, H.T., 'The systematic measurement of the perceived characteristics of information technologies I: microcomputers as innovations,' paper presented to the annual meeting of the International Network for Social Network Analysis, Sunbelt 17, Clearwater Beach, FL, February 1987; Daamen, D.D.L., van der Lans, I.A., and Midden, C.J.H., 'Cognitive structures in the perception of modern technologies,' *Science, Technology and Human Values*, 15, 6, 1990, pp. 202–25; Lea, M., 'Rationalist assumptions in cross-media comparisons of computer-mediated communication,' *Behaviour & Information Technology*, 10, 2, 1991, pp. 153–72; Gumpert, G. and Drucker, S.J., 'From the agora to the electronic shopping mall,' *Critical Studies in Mass Communication*, 9, 2, 1992, pp. 186–200; Steuer, J.S., 'Defining virtual reality: dimensions determining telepresence,' *Journal of Communication*, 42, 4, 1992, pp. 73–93; Cutler, R.H., 'Evolution of sociality within a technological frame,' paper presented at the 43rd Annual Meeting of the International Communication Association, Washington, D.C., May 1993; Samarajiva, R. and Shields, P., 'Institutional and strategic analysis in electronic space: a preliminary mapping,' paper presented at the 43rd Annual Meeting of the International Communication Association, Washington, D.C., May 1993; Bates, B.J., 'The macrosocial impact of communication systems: access, bias, control,' paper presented at the 43rd Annual Meeting of the International Communication Association, Washington, D.C., May 1993; McDonald, D.G., 'Communication technology and the circumplex of motivation,' paper presented at the 43rd Annual Meeting of the International Communication Association, Washington, D.C., May 1993.

17 For a more complete review of this literature, see Lievrouw and Finn, 1990, *op.cit.*

18 Like any graphic representation of abstract concepts, the CSM figure can be criticized as unrealistic or as lacking isomorphism with the concepts being described. For example, temporality, involvement and control may not be orthogonal functions, as the cube form suggests. Likewise, the figure indicates clear boundaries between and among the dimensions of behavior and the progressive layers of social context (the spheres); such boundaries may be softer or fuzzier than the figure implies. However, we have found the figure to be a useful

heuristic device to help explain the interrelationships among the CSM elements.

19 In an earlier discussion of the CSM (Lievrouw and Finn, 1990, *op.cit.*), we went through the exercise of actually placing different communication systems/media in the cube relative to one another. However, this exercise was somewhat misleading because it appeared that in order to place the systems we had to fall back on comparing their technical features. Also, it did not adequately demonstrate the variability such placement might have from situation to situation and from participant to participant. Therefore, in the present discussion we have opted to present the figure only as a heuristic device for understanding the CSM.

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The role of networks in small firm competitiveness

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Abstract: Contact networks as a means of obtaining external information are a well-accepted aspect of firm behavior. For large firms, formal ties, such as strategic alliances and joint ventures, are common, but for small firms more flexible, informal connections are the norm. In addition, semi-formal flexible manufacturing networks have evolved within the US as a means for firms to identify similar and compatible firms for cooperative activities. This paper examines the behavior of firms with regard to the role played by networks in information flow and, at least speculatively, in firm competitiveness. Data come from interviews with firms throughout the US, in both rural and urban settings. Formal networks may be less critical in urban agglomerations, where proximity may provide advantages through informal interactions. Comparisons with industrial districts in Europe provide scope for understanding the role of information in firm behavior.

Keywords: networks, information flow, small firms, cooperation

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Introduction

Networks can be defined as linkages among firms. These linkages can be based on material (input-output) links, a traditional focus of production systems [1], or on information and technology flows. Gelsing makes the distinction between 'trade networks', linking users and producers of traded goods and services, and 'knowledge networks', which focus on the flow of information and exchange of knowledge