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Local Virtuality in a High-Tech Networked Organization*

Abstract: What are networked organizations? The focus of discussions of the networked organization has been on the boundary-spanning nature of these new organizational structures. Yet, the role of the group in these networked organizations has remained unclear. Furthermore, little is known about how computer-mediated communication is used to bridge group and organizational boundaries. In particular, the role of new media in the context of existing communication patterns has received little attention. We examine how employees at a high-tech company, referred to as KME, communicate with members of the work group, other colleagues in the organization, and colleagues outside the organization to better understand their boundary-spanning communications.

1. The Debate about New Organizational Structures

Are new forms of ‘networked organization’ arising, driven by the proliferation of information and communication technologies (ICTs)? Do employees have the trust to communicate over boundaries using ICTs? We use evidence from a case study of a high-tech networked organization to see if communication in the organization largely stays within work groups (as in traditional organizations) or crosses boundaries to elsewhere within the organization or to other organizations.

Recent writings on organizational structure emphasize the emergence of new forms of work (Monge/Contractor 1997; 2003). Generally, two interrelated trends are seen as leading to these changes. The first trend is a shift from an emphasis on systems of production and related manufacturing processes to an economy based on information and the management of intellectual capital toward the development of services and innovation (Andersen/Howells/Hull/Miles/Roberts 2000; Drucker 1993; Quinn 1992).

The second trend is the increased reliance on ICTs for information transfer at

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all levels of the organization. ICTs, and in particular computer-mediated communication (CMC), are serving as a technological driver to create and maintain electronic networks of information exchange. Indeed, Castells (1996) argues that the high reliance on networks has revolutionized the economy and the structure of society creating a social order with the capacity to connect as a unit in real time on a global scale. Even though we do not feel as strongly, we believe that the ubiquity of ICTs is a key feature of organizations that are part of the new economy and see their mandate as providing services based on information and innovation. These two trends have led to organizations where information represents a key asset and the flow of information becomes critical for success (Choo 1998a; 1998b; Davenport/Prusak 1997; 2000). In these new forms of work, have the structure of organizations, and in particular the communication structure, fundamentally changed?

Analysts have suggested that these trends result in networked organizations: communication structures based on electronic networks where information flows flexibly and spans group and organizational boundaries (e.g., Heydebrand 1989; Jarvenpaa/Ives 1994; Miles/Snow 1992; Nohria/Eccles 1994; Sproull/Kiesler 1991; Ward/Wamsley/Schroeder/Robins 2000; Wellman 1997). They contrast such networked organizations with bureaucratic organizations based on pre-Internet forms of information exchange. Bureaucratic organizations are efficient in an environment where the transfer of information is slow and problems are well-defined and fairly routine (Baker 1992; Heckscher 1994; Heydebrand 1989; Miles/Snow 1992; Nohria/Berkley 1994; Nohria/Eccles 1994; Ward et al. 2000). By contrast, the networked organization may have better means than hierarchical, place-based organizations for pooling decision-making and problem-solving resources (e.g., Castells 1996; Nardi/Miller 1991; Sproull/Kiesler 1991). Networked organizations fit the paradigm of the information society because they have the flexibility to acquire information from anywhere and at any time, as barriers of space and time are no longer perceived as impediments for communication (Castells 1996). In the networked organization, loosely coupled structures form, with ties to people outside the work group as well as to outside the organization (Ahuja/Carley 1999; Alstynne 1997; Jarvenpaa/Ives 1994).

Peter Monge and Noshir Contractor define the networked organization as

“a collection of organizations along with the linkages that tie them to each other, often organized around a focal organization. There are numerous variations on the network organizational form including joint partnerships, strategic alliances, cartels, R&D consortia, and a host of others.” (Monge/Contractor 1997, 463)

Similarly, for Manuel Castells, the key feature of the networked organization is the linkages that tie them to other organizations through ties such as alliances, partnerships, and information-exchanges (1996). These boundary-spanning ties make them more open systems whose boundaries are more permeable to information from the outside. They function as interconnectors between multiple networks, providing access to new information and more creative problem solving (Jarvenpaa/Ives 1994). For example, Robin Teigland (2000) has shown that

boundary-spanning information exchanges in a Scandinavian high-tech firm led to higher levels of creativity. The information that these high-tech workers obtained from online communities of practice increased their performance at work.

The underlying assumption in these discussions of the networked organization is that geographical proximity, collegiality, and group membership does not bound communication. In the networked organization, groups are one special type of social network, but not necessarily the dominant structure for communication (Wellman 1997; 2001). For example, cross-functional teams or brainstorming groups are created for only a limited period of time and then cease to exist (Hargadon/Sutton 1997a; 1997b). For accomplishing their tasks, employees rely on information from outside their group and outside their organization. For Castells, the shift from firms as bounded units to the *networked enterprise* is a necessity because

“[c]ooperation and networking offer the only possibility to share costs, and risks, as well as to keep up with constantly renewed information. ... Inside the networks, new possibilities are relentlessly created. Outside the networks, survival is increasingly difficult.” (Castells 1996, 171)

While there has been much optimism around the value of the networked organization for information flow, collaboration, and innovation, few studies have documented the boundary-spanning nature of today's organizations. The metaphor of the networked organization does not provide further detail as to the extent to which group-based communication has changed and the nature of these changes. Are employees bridging group and organizational boundaries as the networked organization perspective predicts? Is boundary-spanning communication occurring at the expense of local, group-based communication?

Extant research has focused on the use of online communities of practice for obtaining information but has not directly compared communication and media use at various distances. One exception is Hinds and Kiesler's examination of the technical and administrative communication patterns of employees in a large organization (Hinds/Kiesler 1995). They studied employees' communication frequencies at three distances: “departmental within the chain of command”; “departmental out of the chain of command”; and “extradepartmental”. More than half of all communication in this study was extradepartmental supporting the notion of networked organizations, where employees contact individuals outside the work group for advice, information, and problem solving. Hinds and Kiesler also investigated what technologies were used for communication at each distance. The authors compared the use of the telephone, voice mail, and email for communication. When employees communicated outside the chain of command and outside the department, they relied more frequently on the telephone than on email. By contrast, email was used primarily for communication within the department and within the chain of command.

Hinds and Kiesler's study provides support for the shift from traditional, densely knit organizations toward the sparsely knit, networked organization. As organizations become more globally oriented and deal with customers and part-

ners worldwide, we expect the trend toward networked organizations to continue. Although Hinds and Kiesler found that employees used the telephone and not CMC for boundary-spanning communication, they suggest that “... comfort and convenience would be expected to shift the use of technology towards asynchronous modes as people communicated with others further away and across time zones” (Hinds/Kiesler 1995, 389). Their study suggests that boundary-spanning communications will continue to rise, and that CMC will play a key role in supporting these communications. However, Hinds and Kiesler did not collect data on face-to-face (FTF) exchanges and suggest that future research should directly compare FTF exchanges with CMC. Furthermore, as organizations introduce new technologies such as instant messaging (IM) in the work place, employees might come to rely more heavily on CMC for boundary-spanning interactions.

In this paper, we examine how high-tech employees communicate at different distances to determine the extent to which boundary-spanning communication is occurring. This examination provides a more comprehensive view of group-based and boundary-spanning communication in the networked organization. Instead of defining communication boundaries and distance in terms of hierarchy and location (Hinds/Kiesler 1995), we focus on communication within the work group, elsewhere in the organization, and outside the organization. In this way, we focus specifically on communication distance as a structural boundary inherent in the functional division of the organization. In the networked organization information flows easily across boundaries and the work group is of less relevance for getting work done. We treat communication distance as proximity because work group members are located more closely to one another than they are to people elsewhere in the organization, and much more distant from communication partners outside the organization. We believe that a shift has occurred toward sparsely knit, networked organizations. Hence, we hypothesize that a large proportion of communication will take place with people outside of the work group.

Furthermore, we investigate the role of CMC in supporting boundary-spanning communication. We build on existing research by comparing CMC with FTF and telephone exchanges. Existing studies have mainly focused on email and little research has compared the use of email to IM. In many organizations employees are now collaborating via IM, either as a complement to email or a replacement (Handel/Herbsleb 2002; Herbsleb/Atkins/Boyer/Handel/Finholt 2002). Hence, we include IM as one more means of communication that allows for convenient and cost effective exchanges at a distance.

While there is agreement that CMC supports boundary-spanning communication, theories of social presence and media richness suggest limitations inherent in CMC. CMC has less ability to convey information about a person's characteristics (e.g., gender, age, and social status) and no ability to convey information about a person's bodily expressions. Indeed, early researchers have argued that CMC is inappropriate for information exchanges when messages are complex and equivocal (Daft/Lengel 1984; 1986; Daft/Lengel/Trevino 1987; Huber/Daft 1987; Lengel/Daft 1988; Brown/Duguid 2000; Cohen/Prusak 2001). Although

laboratory experiments have called this argument into question, there is a need for field data gathered in real organizations. We hypothesized that co-located employees would continue communicating via FTF and the telephone. By contrast, distributed workers for whom FTF is not an option would rely on CMC. Therefore, we expected to find FTF and the telephone used for group-based, local communication and CMC used for boundary-spanning, global communication where FTF is not an option. Thus, we see the role of CMC as an alternative means of communication that leads to boundary-spanning ties and helps bridge organizational and group boundaries.

Our findings come from a case study of a high-tech firm that is representative of the workings of networked organizations. Knowledge Management Enterprises (a pseudonym) is a mid-sized organization located at the heart of one of North American's high-tech hubs. KME was founded in 1997 and expanded during the technology boom. The company's main business consists of a software development group, which is responsible for updating and improving KME's software. The company also has a management services group, which is responsible for managing the online services offered by the company. Like many start-ups in the high-tech sector, KME operates in a more horizontal communication structure. As a company founded after widespread diffusion of the Internet and related technologies, it is a good prototype for an investigation of the communication structures of networked organizations.

2. KME: A Case Study for Understanding Networked Organizations

We collected data on communication patterns and media use at Knowledge Management Enterprises. We selected KME as the site for the study because it is a software and services company that routinely uses CMC as part of its everyday life. KME started when Internet technologies were widely available in the United States, and it has incorporated CMC into its operations from its founding. Hence, KME is not an organization that first operated before the Internet and then adapted to CMC. Moreover, KME was a useful research site because employees were co-located at a single place, while at the same time conducting business on a global scale as its customers and users were located across North America, Europe, and Asia. This allowed examining boundary-spanning and local communication simultaneously.

At KME, we studied the software development and management services groups, whose 28 employees comprise 35 percent of the total workforce. These two groups have existed as functional units for at least one year, and the tasks accomplished within each group are interrelated and fairly homogeneous. Hence, we expected to find stable patterns of communication and use of CMC. Twenty-seven employees completed the questionnaire, yielding a 96 percent response rate. Before administering the questionnaire, we conducted a pilot test with 6 respondents. There were 11 (3 women) participants in the software development group and 16 (5 women) in the management services group. Respondents

had worked for KME for an average of 28 months (range: 5-48 months). Six respondents had a high school diploma or less, 12 respondents had completed an undergraduate degree, and eight respondents had a graduate degree. The data on education is missing for one respondent. The sample included 3 upper managers, 5 middle managers, and 19 group members.

The survey included questions about employees' communication frequency at each of the three distances of interest: group-based, with other colleagues in the organization, and with colleagues outside the organization.¹ Within the work group, employees had a total of 11 and 16 potential communication partners in the software development and management services groups, respectively. Members of the software development group and the management services group had ties elsewhere in the organization with 69 and 64 potential communication partners, respectively.²

For each distance, participants were asked to indicate – on a scale ranging from 1 = never to 7 = daily – how frequently they used the following three media: (1) FTF and the telephone; (2) email; and (3) instant messaging (IM). For each distance and medium, the mean rate of communication was computed across both groups. The 7-point scale was recoded into a scale reflecting 'days per year' to provide a numeric representation of the frequency of use that was easier to comprehend. For example, the category '1/week' was recoded into '52 days per year.'³ While the 'days per year' scale was used to depict the data in graphs and tables (i.e., for the descriptive statistics), the original categorical scale was used for all the statistical tests (i.e., inferential statistics). To supplement the survey data, we did in-depth interviews and observations with a sub-sample of 10 employees. Interviews lasted about 45 minutes and the observations lasted for an entire workday (approximately 9 AM to 5 PM). To aid anonymity, we refer to respondents by pseudonym, and we omit hierarchical position and other identifying characteristics.

¹ In the questionnaire, participants also reported on their use of information sources, and their social and communication networks. The analysis in the present paper focuses only on the communication questions. See Quan-Haase/Cothrel 2003 for analysis on the use of information sources data.

² This study focused on frequencies of communication only. Therefore, no data are available about the overall number of communication partners outside KME.

³ The original 7-point scale was transformed into days per year: 'never' = 0; 'a few times a year' = 5; '1/month' = 12; '1/week' = 52; 'several times a week' = 130; '1/day and several times a day' = 365.

Table 1: Items Measuring Demographics and Communication Frequencies
<p>Education What is the highest level of education you have attained? Scale: 1=High school diploma; 2=Undergraduate degree; 3=Graduate degree</p>
<p>Time at KME How long have you worked with this organization? Scale: Years and months</p>
<p>Face-to-Face and Telephone Calls For each of the following personal information sources, indicate how frequently you use offline (e.g., meetings, phone calls, lunches, etc.) means of communication for work-related purposes. Colleagues within the work group. Colleagues outside the work group but within KME. Colleagues outside organization. Scale: 1=never; 2=a few times a year; 3=1/month; 4=1/week; 5=several times a week; 6=1/day; 7=several times a day.</p>
<p>Email How often do you send/receive emails from colleagues within the work group? How often do you send/receive emails from colleagues within your organization, but outside the work group? How often do you send/receive emails from colleagues outside of your organization? Scale: 1=never; 2=a few times a year; 3=1/month; 4=1/week; 5=several times a week; 6=1/day; 7=several times a day.</p>
<p>Instant Messaging How often do you use instant messaging to communicate with colleagues within the work group? How often do you use instant messaging to communicate with colleagues within your organization, but outside the work group? How often do you use instant messaging to communicate with colleagues outside of your organization? Scale: 1=never; 2=a few times a year; 3=1/month; 4=1/week; 5=several times a week; 6=1/day; 7=several times a day.</p>

3. Over what Boundaries are High-Tech Employees Communicating?

Is communication at KME spanning group boundaries? CMC facilitates communication at a distance overcoming barriers of space and time. CMC allows for easy and quick information exchange across group boundaries connecting colleagues anywhere in the organization. However, what remains unclear is the extent to which CMC facilitates boundary-spanning communication within the organization. Is boundary-spanning communication occurring to such an extent that it replaces group-based communication?

Although a large proportion of communication is with colleagues elsewhere in KME, with a mean of 178 communication days per year, most communication continues to be within the work group, with a mean of 285 days per year (see Figure 1). Even in this high-tech organization, where employees have diverse CMC tools available to them for boundary-spanning communication, they continue to exchange information primarily with other group members. The ratio of communication with other colleagues in the organization to group-based communication is 0.62,⁴ suggesting that communication with other colleagues in the organization has not replaced group-based communication.

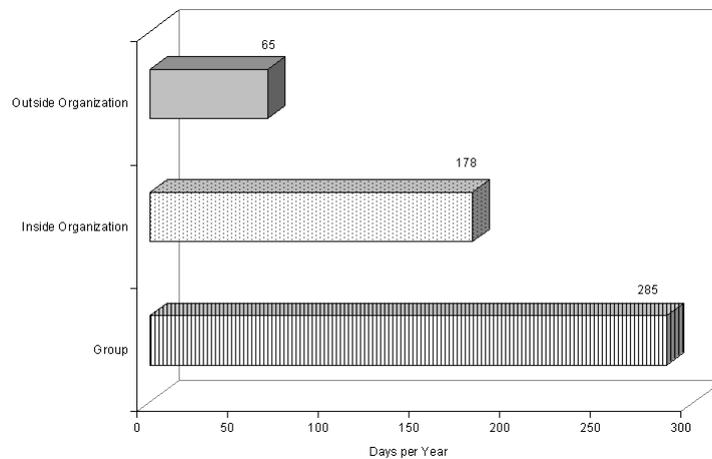


Figure 1: Communication by Distance

If communication has bridged the group boundary and includes other organizational members, is it also spanning the organization's boundary? Considering

⁴ These ratios were obtained by calculating the proportion of communication between distances. For example, the ratio 'Colleagues Inside Organization/Work Group' is $178/285=0.62$. In this example, the mean days per year communication with colleagues elsewhere in the organization is divided by the mean days per year communication within the work group.

that KME is a global organization with clients and partners worldwide, we expect that frequent communication would occur at a distance. However, we do not expect that communication outside the organization would be larger than group-based communication or communication with other colleagues in the organization. We expect that the fact that people are co-located would facilitate local communication.

Work communication with people outside of KME occurs at a mean of 65 days per year. This is less communication than with group members (285 days per year) and colleagues elsewhere in KME (178 days per year). The discrepancy between group-based communication and outside communication is stronger than is the case for organizational communication. Much more communication takes place at the group level than with outside colleagues. Thus, even at KME, where business is conducted globally, the group continues to be the key unit for communication. The ratio of communication with members outside the organization to group-based communication is 0.23, showing that most communication at KME occurs within the work group. Similarly, the ratio of communication with members outside the organization to communication with members of the organization is 0.37, suggesting that the amount of communication decreases considerably from internal to external.

To compare communication inside and outside the work group, the scores for communication with other colleagues in the organization are pooled with those for communication outside the organization. This yields a mean score for overall outside the work group communication. Even when comparing communication inside the group versus outside the group, group-based communication is more frequent, with a ratio of 0.85. The ubiquity of CMC and its boundary-spanning capabilities do not seem to replace group-based communication with boundary-spanning communication. By contrast, the data show that even when all outside communication are lumped together, group-based interactions are still higher.

Despite this high level of within-group interaction, the data show some support for viewing KME as a networked organization. A large proportion of all communication takes place with people outside of the group: both with other colleagues in the organization as well as outside the organization. This suggests that CMC helps overcome group and organizational boundaries without making group and organizational boundaries obsolete. Although propinquity may constrain organizations less today, the group in high-tech KME continues to be the primary source for information and communication.

4. What Media are Used for Different Organizational Involvements?

Although most communication continues to take place within the boundaries of the group, a sizeable amount of communication takes place elsewhere in the organization and even outside of the organization. What media are supporting boundary spanning? Theories of the networked organization argue that CMC encourages communication across boundaries because it provides a meeting space

for people with shared interests that overcomes the limitations of space and time (Baym 1995; 1997; Sproull/Kiesler 1991; Wellman/Gulia 1999). In turn, boundary-spanning communication with multiple, distant others fosters sparsely knit, networked organizations.

While we agree with analysts who claim that CMC has seriously affected the organization of many forms of work—especially where employees work with bits rather than atoms—we wonder about the nature of these transformations. We wonder if:

1. Does the preference for CMC only apply to geographically-distant communication partners?
2. Do co-located employees communicate primarily via FTF and the telephone because these media are richer and better support complex and equivocal messages (Daft/Lengel 1984; 1986; Daft et al. 1987; Huber/Daft 1987; Lengel/Daft 1988)?
3. If FTF communication were not an option because of constraints of distance and time, then would CMC be the most frequently used medium?

By examining these three questions, our research provides a better understanding of how high-tech employees use CMC and traditional media for communicating at different distances.

The KME data show that communication within the local group relied more on CMC (email and IM) than on traditional media (FTF or the telephone). Repeated-measures analysis of variance (3x3 MANOVA) confirms these findings, with distance and type of media as the within-subjects factors. The analysis yields a significant effect of distance, $F(1,26) = 66.82$, $p < .001$, and of type of media, $F(1,26) = 15.60$, $p < .001$. There is no significant interaction of distance and type of media, $(1,26) < 1$, $p = \text{n.s.}$

CMC accounts for a large proportion of all communications within the group. Contrary to our initial expectations, group-based communication relies significantly more on email (306 days per year) and IM (306 days per year) than on FTF and the telephone (240 days per year; see Figure 2). The use of CMC outweighs FTF: email is used 1.28 times more frequently than FTF and the telephone, and IM is used 2.13 times more frequently than FTF and the telephone.⁵ Communication to elsewhere in the organization follows a similar pattern to communication within the group. Email (213 days per year) and IM (215 days per year) are used most frequently, while FTF and the telephone are used less for communication (101 days per year). For communication within the organization, the ratios of CMC to FTF are even larger: email is used 2.11 times more frequently than FTF and the telephone, and IM is used 3.41 times more frequently than FTF and the telephone.

Communication outside the organization occurs more frequently by email (103 days per year) than by FTF and the telephone (21 days per year). Similarly, IM (72 days per year) is used more frequently than FTF and the telephone

⁵ These ratios were obtained by calculating the proportion of frequency of one medium by another. Thus, the ratio 'IM/FTF-phone' for contact in the group is $306/240=1.28$. In this example, the mean days per year communication via IM in the work group is divided by the days per year mean communication via FTF-phone.

for communicating outside the organization. The difference between CMC and traditional means of communication for outside communication is large: email is used 4.9 times more frequently than FTF and the telephone, and IM is used 3.4 times more frequently than FTF and the telephone. This is consistent with the notion that electronic networks support boundary-spanning communications at KME with customers, partners, and users who are distributed globally. As expected, FTF is used less for communication outside the organization.

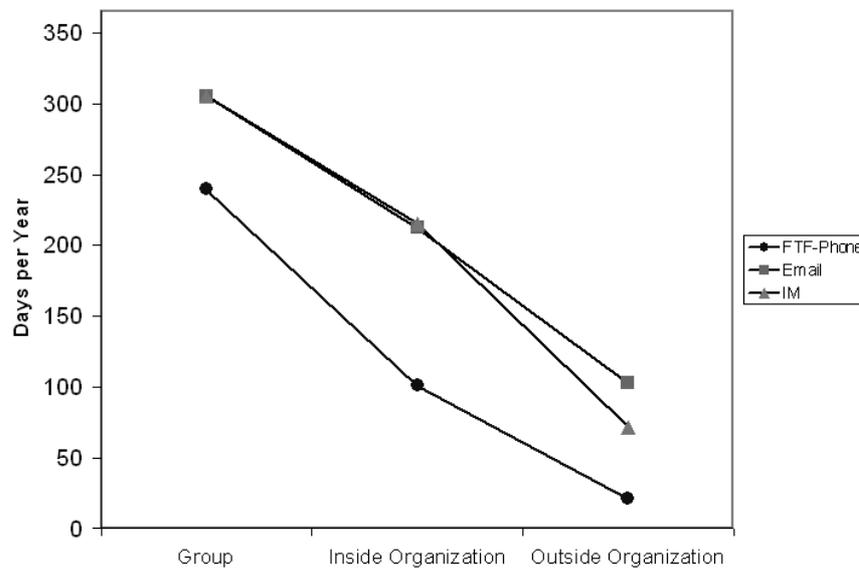


Figure 2: Communication by Distance and Type of Media

5. CMC and Communication at KME

The high use of CMC within the work group is surprising, given theoretical arguments maintaining that CMC primarily supports global, boundary-spanning exchanges of information while FTF and the telephone support local, group-based exchanges. Why is there such a strong reliance on CMC within the work group? Why do employees prefer to exchange information via CMC than FTF with other work group members? There are several possible explanations for this *reversed effect of media use*.

First, we may be observing a change unique to high-tech organizations in the use of CMC and traditional media. Organizations, such as KME, that have multiple and the latest technology available for communication, may prefer to rely on CMC for information exchanges. CMC is simply the *modus operandi* of

the organization, with organizational norms outweighing message-media fit. This explanation is in accord with the notion of the networked organization, but not in the expected way. It supports the idea that communication has moved from traditional media to electronic networks, but it does not support the idea that these electronic communications are used only for long distance communication. Indeed, people are more likely to use CMC *locally* to communicate with other group members.

Second, CMC may provide high-tech employees with an easier and more convenient form of information exchange because it allows for fast and continuous exchanges. At KME, communication occurs almost simultaneously over multiple media, and not just sequentially. For example, employees answer an IM and at the same time have a FTF conversation. IM takes priority over FTF and the telephone in this fast-paced environment, where information requests have to be fulfilled instantaneously. Thus, employees do not switch between media and people for communication, but rather use various media simultaneously to interact with different people. Moreover, the limitations ascribed to CMC by the social presence and media richness theories may not apply to high-tech organizations where employees are technology savvy and are used to communicating efficiently over CMC.

Third, CMC is not disruptive of work processes in the same way that FTF and the telephone are. The physical setting at KME is small, and people work in a crowded workspace. Under these conditions, CMC provides an alternative and less disruptive means for communication as the following quotes by two community managers indicate:

“Every time I say: ‘Hey, bla bla bla’ ... , it is just an interruption to them. Lori and I don’t talk as much as we used to during the day because we are too close to other people who are not doing the same stuff and just get distracted.”

“I don’t want to be loud because there are all these people right there. So phone is o.k., but I feel I am invading other people’s privacy, if I am loud on the phone. So the best way for me is email plus I like to keep a written record of everything that is going on.”

Fourth, the time it takes to write an email and IM is shorter than the time it takes to engage in a FTF or telephone conversation. It may be that the pattern of communication would look different if we had collected data on the time employees spent communicating via each medium, instead of examining the frequency of their communications.

6. Conclusion

6.1 Groups in Networked Organizations

Discussions about networked organizations have emphasized the boundary-spanning nature of this new form of organization as a quintessential feature for information acquisition and diffusion. Our study of KME, a high-tech firm located in

North America, compared communication inside and outside the work group and the organization to investigate the extent of boundary spanning. Although CMC provides new and alternative ways for communication that facilitates easy and effective bridging of group and organizational boundaries, most communication takes place within the work group, rather than with others in the organization or outside the organization. Despite the need for boundary-spanning communication and the technological ease for doing it with CMC, the work group is still the most important source for information at KME. It is where employees find community, build friendships, and get work done. That boundary-spanning interactions did not occur at the expense of local interaction suggests that groups are not a relic of the past, but constitute the central focus of communication. This suggests that boundaries of distance and group continue to constrain communication.

Yet, boundary-spanning communication with people elsewhere in the organization and outside the organization comprises a substantial amount of interactions. At KME, CMC appears to have allowed communications outside the group to be added more easily to communications within the group.⁶ This combination of within-group and extra-group communication has important implications for how the networked organization is conceptualized because it suggests that there is a need to focus simultaneously on boundary spanning and local communication linkages.

The concept of *glocalization* helps to describe this situation of being simultaneously globally linked and locally engaged (Hampton/Wellman 2003). Employees at KME are able to move seamlessly between local and more distant interaction as they use email and IM to communicate. The perspective of the networked organization provides an incomplete picture of organizational communication structures. Consideration of boundary-spanning communication is best understood in the context of local, group-based communication. It should include simultaneous analysis of distant and local communication.

Although the present study focused on the frequency of communication of employees at KME at various distances, a limitation is that it did not compare directly the number of communication partners at each distance and the strength of the relationship between communication partners. Hinds and Kiesler (1995) in their study of boundary-spanning communications in a large organization found an association between the number of potential communication partners at each distance and the actual frequency of communication. Future research could use a social network analysis approach in order to obtain more fine-grained data on the number of communication partners connected to each employee at different distances. This would provide further insight into the changes that are occurring in networked organizations in terms of local and boundary-spanning communications.

⁶ As the results are based on cross-sectional data, it is difficult to make a comparison between communication patterns before CMC and after CMC. Moreover, KME has used CMC as an integral part of its communication since it was founded. Future research will compare communication at KME to communication at a more traditional, non-networked organization.

6.2 Local Virtualities

At KME, most exchanges with colleagues in the organization are via CMC: with equally frequent use of email and IM. The high reliance on online ways of communicating with colleagues is particularly interesting in light of the fact that employees in this organization work co-located. One may think that the fact that people are not interacting visibly in public spaces means that they are in isolation. However, they are going online to exchange emails and IMs with colleagues who are sitting right next to them. Communication has moved from the physical space to the virtual realm, where conversations consist of typed words. This finding is difficult to reconcile with the networked organization perspective, where CMC is argued to support exchanges that extend beyond the local setting, creating sparsely knit, boundary-spanning structures (Monge/Contractor 1997; 2003). By contrast, KME is a bounded physical place where people use CMC heavily to support local exchanges and densely knit structures. The findings corroborate Hinds and Kiesler's data, where employees used CMC for local communication and the telephone for boundary-spanning exchanges (Hinds/Kiesler 1995). The high volume of CMC use, within the group and beyond it, strongly suggests that ICTs do not weaken trust in organizations. It is the social structure that is important for trust, and not the communications media.

CMC is contributing to new forms of interaction in organizations that blend email, IM, FTF and telephone contact for both local and distant interactions. Our findings suggest a different perspective on new organizational structures: the prevalence of 'local virtualities'. Local virtualities are technology-intensive settings, such as KME, that use CMC extensively for local communication. Although communication takes place locally in the confines of a group or organization, CMC serves as the main means of interaction. Where analysts originally saw CMC as long-distance communication media, our research has made clear the intensive local use of CMC.

The norms of media choice have reversed themselves in the decade since CMC first became widely used in the early 1990s. KME workers do not use CMC only because it is cheaper and more convenient than the telephone for contacting distant ties. They use CMC because they are sitting at keyboards and screens all day, they habitually use computers for many tasks, and they regard computers offhandedly as routine means of communication rather than as exotic media for special situations. At KME, computers are the routine means of communication; FTF and especially telephones are the unusual means for special situations.

In the case of KME, it is the intensive use of CMC that has led to local virtualities. We believe that not only high-tech companies function as local virtualities. Other companies that have embraced CMC may also rely heavily on computer-mediated forms of communication for local exchanges. CMC will be the *modus operandi* for most companies founded today and in the future.

Our findings also suggest that other factors may also affect the creation of local virtualities. The tasks workers tackle influence their choice of media. KME high-tech workers prefer media that allow them to multi-task. The crowdedness of the workplace also influenced the choice of media for local communication.

Other factors that may influence the degree of CMC use are the social norms of the organization and work group, the history of technology adoption, and individual user preferences. Future research needs to investigate how these various factors are related to one another and how they lead to different communication patterns. Furthermore, the consequences of different communication patterns for the performance of a work group and organization need to be examined.

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