

Local Virtuality in an Organization: Implications for Community of Practice

Anabel Quan-Haase⁺, Barry Wellman^{*}

⁺University of Western Ontario, Canada; ^{*}University of Toronto, Canada
aquan@uwo.ca, wellman@chass.utoronto.ca

Abstract. We focus on two phenomena in our case study of a high-tech firm. *Local virtuality*: The pervasive use of computer mediated communication for interaction with physical proximate people, even when located near-by. *Hyperconnectivity*: The instant availability of people for communication anywhere and anytime. We show that computer mediated communication has gone beyond long-distance media to be the predominant mode of communication. The result is a high level of trust and community, especially in a department with high interdependence and a common goal.

A Computer Mediated Organization

Even as computer mediated communication (CMC) – the internet and all that – permeates most organizations, there is more assertion than evidence about how CMC is actually affecting them. How does CMC affect communication, community and trust in organizations? The routinized, normalized use of CMC is especially evident in high-tech companies of knowledge workers whose employees are technologically savvy. Hence, we use a case study of communication in such a high-tech firm to address this question. We focus especially on two phenomena in the firm. (1) *Local virtuality*: The pervasive use of computer mediated communication for interaction with physical proximate people, even when located near-by. (2) *Hyperconnectivity*: The instant availability of people for communication anywhere and anytime.

We argue that CMC facilitates collaboration, but only when it works within the norms and structure of collaborative community. We suggest that computer-supported social networks flourish in organizations where information represents a key asset, informal networks have supplemented traditional hierarchies, the flow of information has become critical for success, and communication often crosses work group and organizational boundaries. We ask if collaboration in such a community is based on an interdependent, organic solidarity where people feel a sense of reciprocity toward other members of the community and make their information freely available? Are relations principally peer-to-peer or hierarchical? We wonder if employees are bridging group and physical boundaries as the information and communication technologies (ICT)-networked organization contends? Is communication across boundaries occurring at the expense of local, within-group communication?¹

The debate about the effects of technology on organizational communities is a continuation of a 150-year-long tradition in the social sciences to see if community is declining or flourishing since the Industrial Revolution. Our research calls into question two beliefs: One, that CMC destroys community or at least is ineffective because it is disconnected from community; the other that CMC enables enormous increase in cooperation by allowing far-flung people to interact. The first of these sees only traditional community as valid; the second ignores the need for community and trust entirely. Our argument is a third one: that CMC enables wider collaboration but only when it works within the norms of collaborative community.²

Rather than analytically isolating CMC, we study it in the real world context of how it is embedded in a variety of ways in which workers actually communicate, including FTF and telephone communication. We show how CMC has become routinized and integrated in an organization, creating hyperconnected local virtualities of ubiquitous, multiple communication. We analyze how the different characteristics of specific CMCs afford somewhat different communication possibilities. For example, the store and forward nature of email supports asynchronous exchanges where sender and receiver do not have to be online simultaneously. By contrast, instant messaging (IM) demands simultaneous presence for successful communication.³

¹ Émile Durkheim's seminal discussion of organic solidarity, *The Division of Labor in Society*, was published in French in 1893 and translated into English in 1933.

² The debate about the internet and community is collated and summarized in Wellman and Haythornthwaite (2002), Walther (1997), and Spears and Lea (1992).

³ Asynchronous communication is also starting to become more popular on IM as teenagers and adolescents leave each other messages when not online.

KME: A Case Study

We use a case study of a high-tech, CMC-pervaded organization to illuminate the situation. Knowledge Media Enterprises (“KME”, a pseudonym) is an 80-employee high-tech corporation located in a major North American city. KME was founded in 1997 and expanded during the technology boom. Its involvement in knowledge-intensive activity and its high reliance on CMC make it a good place to study collaborative community in a networked organization. KME is a post-industrial firm that offers knowledge-based services and software to clients for whom it hosts and facilitates online communities of practice. As a high-tech firm, KME has the latest communication equipment, and all employees are technologically savvy. This makes KME a good place to investigate how CMC support collaborative community.

Data collection took place in 2002 through surveys, interviews, and observations: 27 out of 28 departmental employees responded to the survey: 11 in the software development department and 16 in the client services department. The lengthy self-administered survey gathered information about communication at each of three social/locational distances: within the department, with other colleagues in the organization, and with people outside the organization.⁴ In addition, participants reported about how often they seek information from and socialize with colleagues in both the software development and client services departments. This allowed us to examine employees’ social networks.

Ten survey participants were interviewed by Quan-Haase in December 2002, with each interview lasting approximately 45 minutes. Five employees were recruited from each department, coming from a range of positions and roles. The interviews focused on the employees’ use of information sources, social contact, communication patterns, problem solving techniques and use of media.

There were four women in the sub-sample; this ratio is approximately representative of the gender distribution in the complete sample. Participation in the interviews and observations was voluntary.

This chapter is based on questions in the interviews about the use of media. The purpose of these questions was to understand participants’ personal media use and unique media profiles, including what media participants believe are appropriate for communicating with different types of communication partners and for communicating different types of messages. In this way, the social context of media use also could be examined.

Specifically, participants were asked what type of media they use on a daily basis to communicate with colleagues inside and outside of KME. They were also

⁴ For more information about the use of information sources and working relationships in KME, see Quan-Haase and Cothrel (2003), Quan-Haase (2004), Quan-Haase and Wellman (2004, 2005). The scale for the instrumental, social and media networks was: 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.”

asked about each medium's relevance for their work in terms of frequency of use and types of tasks performed. To obtain more detailed information on media use, participants were also asked about what aspects of each medium they perceived as most useful – and why. In addition, participants were asked to report what type of medium they thought of as optimum for specific kinds of communication and information search and to discuss the characteristics of the medium that they felt made it the best choice. Participants were also asked to report specific instances that were representative of their use of various media.

The interviews were tape-recorded, transcribed, and imported into NVIVO software that is specifically designed for the analysis of interviews. We followed Anselm Strauss' grounded theory when using NVIVO to code the interviews, developing themes through coding. We discuss here only on the themes that relate to media use, the maintenance of community.

Quan-Haase also observed full-day work practices to help understanding of how people handled CMC, and how they fit CMC into their relationships and communication. She observed the everyday work practices of a sub-sample of 10 KME employees for two weeks: each department was observed for one week. One-on-one observations were conducted during employee's workdays because otherwise interactions taking place online would have been missed.

The analytic framework employed for the observations was a combination of grounded theory and social network analysis. Notes were taken on a daily basis and behaviors were recorded in a time diary. The notes were then coded and themes were developed in the same grounded theory manner as with interviews. Social network analysis guided the observations by focusing our attention on social relationships and their influence on the choice and use of media.

The one-on-one observations started at 9.00 AM and finished when the employee left the office (at approximately 4.30 PM). Through one-on-one observations of a workday, all FTF and online interactions could be observed and recorded, including email, instant messaging, FTF and phone exchanges. The start and end time, duration, and content of interaction were recorded.

The Software Development and Client Services Departments at KME

We compare work roles and communication patterns in two main KME departments: *software development* and *client services*. While tasks are somewhat similar within each department, they are different across the two departments. The *software development* department had existed for 2.5 years and consists of 12 employees.⁵ Its main task is to create software packages that are largely used by the client services department. The *client services* department had existed as a functional department for 4.0 years and consists of 16 employees. The client

⁵ At the time of data collection, one employee from the software development department was on holidays and did not participate in the study.

services department supports communities of practice for other organizations that operate online to exchange knowledge.⁶ Some of their clients are units of large, world-famous organizations. The department works hard and skillfully to create *virtual localities*: online “spaces” where participants would sign on, come to know their electronic neighbors, and share best practices.

The software development department is expected to develop and implement new functionalities quickly. As the industry is under intensive scrutiny, software must be innovative and high quality. By contrast, the client services department is expected to work closely with clients and provide them with high-quality services. The client services department does not operate to the same extent under the time and innovation pressures of the software development department. The software development department is isolated from the rest of the company, a separation that developers regard as advantageously allowing them to concentrate on their work without being distracted by noise and interruptions from other departments. Software developers work in a large open space, with a washroom and a small kitchen next to the meeting room,

The work culture of the two departments is very different. The KME software development department consists of a highly qualified team of programmers that were formerly employed by companies such as Microsoft. The work culture of the software development department is characterized by the highly individualistic work habits of programmers.⁷ Often, there is no predetermined work schedule. In the lead up to a release date, employees often work at least 50 to 60 hours per week. The software development department also frequently socializes by going out for lunch or coffee. Many of the meetings are impromptu, taking place in a small meeting room in the middle of the office. A high level of communication and exchange between members of the software development department is necessary because of the interdependence of all components of the project.⁸ Moreover, consultation on design issues is also required because they affect the operability of the code. The software development department functions as a cohesive, horizontal team. Although three managers (1 upper manager and 2 middle managers) oversee the development cycle and ensure compatibility of the software components, individual department members work independently. Furthermore, all members of the department are involved in decision-making for

⁶ A good discussion of what communities of practice are and their relevance to knowledge sharing in organizations can be found in Wenger (1998, 2000) as well as Wenger, McDermott, and Snyder (2002).

⁷ In accord with Carmel and Sawyer (1998), the work of software developers reflects many attributes of the entrepreneurial legend: long hours, grit and determination, and high risk. See also Boorsook (2000), and Taylor (1999).

⁸ Brooks (1974) in his investigation of how IBM developed the Systems 360 operating system documented how team behavior was the driver of software development. While this is also the case at KME, where employees work on a single software that requires high levels of integration, it is important to note that not all software development depends on highly interrelated tasks.

the development cycle. This is essential because individual components must be successfully integrated.

By contrast, the client services department works more independently. Community managers are not required to coordinate their activities because their work consists of interacting with individual clients. As such, community managers communicate primarily with clients and their respective managers. They work in cubicles. Their structure and culture is individualistic. Each online community has a dedicated community manager assigned to oversee the needs of the client and the users. This reporting structure means it is unnecessary for community managers to collaborate or communicate frequently with other community managers.

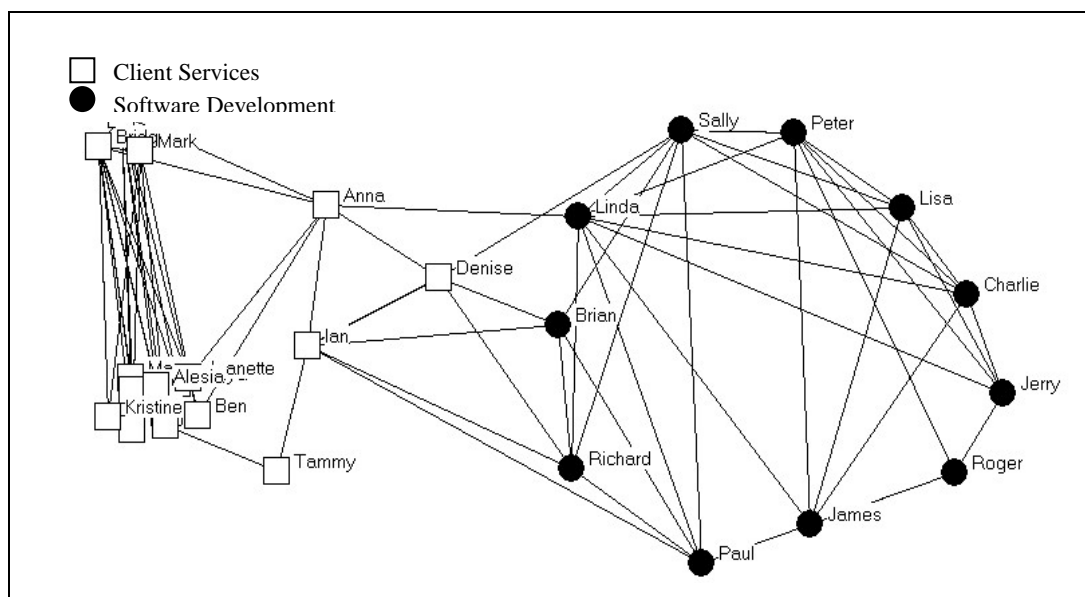


Figure 1. Information Network- Weekly Exchanges

Work Networks

We had not expected differences in communication to be extensive between the two departments. In practice, connectivity within the two departments has quite distinct patterns.⁹ The software development department is a densely knit network that resembles a core team. Pairs of people in the software development department communicate more often on a daily and weekly basis. Moreover, people in the software development department communicate with a higher percentage of fellow department members than do those in the client services department. The software development department was relatively egalitarian, with managers and developers having similar communication patterns. This suggests that all individuals are sought for information regardless of their

⁹ To investigate the instrumental networks of the two departments, we examined weekly exchanges of information among department members and between departments.

hierarchical position. By contrast, the client services department is sparsely connected. Most information exchanges occur between department members and managers, or among managers. There is little communication among department members. Figure 1 shows how middle and upper managers are clearly the most central persons in this department. Thus, managers in the client services department are more likely to be the harbingers of information in comparison to the software development department, where department members are as likely to control the flow of information as managers.

Socializing Networks

We asked KME employees how often they meet colleagues from their own department or from the client services department for lunch, coffee, dinner, and/or a drink. Like the work network, Figure 2 shows that the socializing network of the software development department is more densely-knit than the network of the client services department. Moreover, in the software development department, there is no difference between hierarchical positions in terms of socializing.

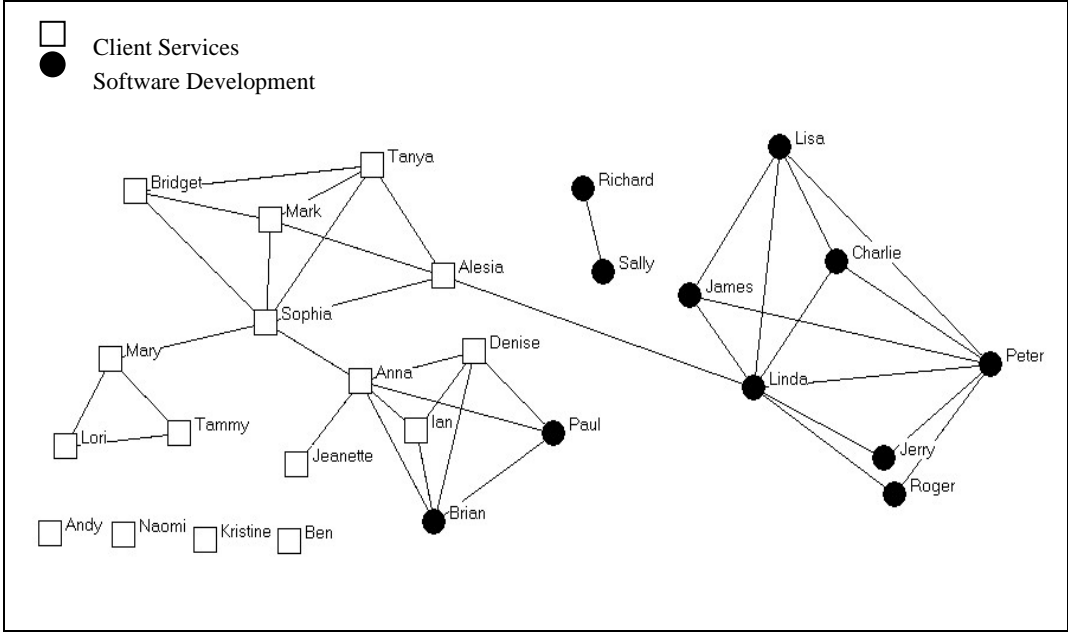


Figure 2. Social Network –Annual Interactions

By contrast, upper managers in the client services department are linked to each other, but in the socializing network they are not linked to other department members as they are in the work network. In the software development department, two department members are isolated from the rest of the department and only socialized with each other. In the client services department, there are more isolates – a total of four department members. In addition, the department is divided into three clusters linked by a single person: Sophia.

In short, work exchanges on a weekly basis occur primarily within the boundaries of the departments, with few bridging ties. Information exchanges follow the hierarchical structure of communication of the organization in the client services department, but not in the software development department, where department members exchange information among themselves. In the client services department, managers are central for the flow of information. Overall, socializing occurs less frequently than information exchange in both departments. Again, the software development department has denser socializing networks than the client services department. While socializing also primarily occurs within the boundaries of the departments, two members of the software development department are part of the socializing network of the client services department. Thus, important work and social linkages exist between the two departments.

High-Tech Collaborative Community at KME

Hyperconnectivity

KME people communicate a lot: informing, coordinating and collaborating. Collaboration in this technology-intensive firm takes place both face-to-face (FTF) and via CMC. Most communication is within the department. Employees report a mean of 285 days per year of within-department communication.¹⁰ Although lower in frequency, CMC is also the predominant means of communication between departments, with a mean usage of 213 days per year for email and 215 for IM. Employees also communicate a mean of 178 days per year with people elsewhere in KME. The ratio of communication with colleagues elsewhere in the organization to within-department communication is 0.62.

When they communicate, employees share best practices and jointly address problems. Local virtuality – the use of CMC for local communication – is endemic.¹¹ Employees use CMC regularly as a convenient means of collaborative communication, creating a dense virtual network of exchange. Their frequent communications online have taught them whom they can trust – to respond, produce, provide reliable and valid information, and to keep confidences and commitments.

¹⁰ The original 7-point scale has been 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. Much social network research has shown that while specific metrics of communication frequency tend to be unreliable, comparative metrics tend to be valid. The ratios have been 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.

¹¹ See Quan-Haase and Cothrel (2003) for a discussion of the emergence of local virtualities at KME.

Most are hyperconnected,¹² although the degree of hyperconnectivity is not only a result of the technology-intensive nature of KME. Task complexity and task interdependency are key factors in determining group structure and CMC use. Hyperconnectivity is more pronounced in the software development department, where tasks are interdependent, than it is in the client services department, where tasks are independent.

Collaborative Community

Formal Meetings and Informal Exchanges

Collaboration at KME operates through both formal meetings and informal exchanges. Formal meetings occur frequently in both departments. They are scheduled routinely in advance or on an *ad hoc* basis to deal with emergencies. They are held in the two departments' meeting rooms equipped with speakerphones and audiovisual equipment.

All employees in the software development department are customarily present during formal meetings. Ad hoc meetings are more common in the software development department because decisions made about the software can influence various components and it is considered important that all members are aware of these changes. Developers need to be up-to-date with changes, decisions or problems occurring with the software. Their expertise is valued, and their input is considered relevant. This emphasis on participation is a key aspect of the way the software development department works as a collaborative community.¹³

Formal meetings also occur frequently in the client services department. However, not all department members attend all meetings. The only ones who attend routinely scheduled meetings are those working on a specific account and the managers and middle managers. *Ad hoc* meetings typically take place between two or three employees. The client services department's large size makes it difficult to schedule meetings for the entire department. The lack of common meetings creates fragmentary understanding of other employees' challenges and problems in their accounts. This has led to lower levels of understanding among employees and to a collaborative community that is less tightly knit.¹⁴

¹² A search on Google provided a number of hits for the term "hyperconnected." The way the term hyperconnected is used varies considerably among the sites. The term is usually not defined. Some links referred to a usage of the term hyperconnected in the context of mathematics. In general, in the context of technology, hyperconnected is used to refer to the connections between web sites. Biz Stone (2004) uses the term hyperconnected to refer to the linkages between weblogs. Wired Magazine used the term to describe children who are born in the digital age (Wired Magazine, 2002). None of the uses that we are aware of have applied the term to refer to physical work settings where workers are always on, available for communication anywhere and anytime.

¹³ The high degree of collaboration among the software development department reflects previous arguments that the most important factor in software development is team interaction, which has been referred to as "peopleware" (DeMarco and Lister (1987) and Constantine (1995)).

¹⁴ Cohen and Prusak (2002) see the creation of shared understandings among coworkers as a key

While formal meetings are important and provide an opportunity to share knowledge, communication, coordination and collaboration is usually informal. Most informal collaborations take place one-on-one rather than in groups, with people contacting someone to discuss their needs. The most common communication is asking questions to obtain clarification or work lore about a specific matter. However, there was frequent communication devoted to in-depth problem solving, where one person would help another make sense of a problem and think through various strategies to find a solution. A third type of communication occurred when the person originally contacted referred the questioner to others better equipped to help.

Commitment to Community

Commitment at KME is interpersonal, departmental, and organizational. FTF meetings and encounters provide a broad bandwidth of communication, enabling employees to assess voice tone, body language, and physical presentation of self. Frequent CMC has bred *interpersonal* awareness, understanding, and trust. But, while CMC does not allow people to smell each other, its highly frequent use provides a ubiquitous, backcloth of communication. The combination of CMC, FTF and phone communication enables people to understand the concrete interests and identities of others in collaborative relationships, and to provide the communication auspices for creating and maintaining trust.¹⁵

As a *department*, software development is more committed to collective community than client services. Software development's small size and focus on a single goal fosters group cohesion. The developers feel ownership of the software and commit much time and effort to improving it. By contrast, "community managers" in client services often work on different accounts. While most employees do similar work, their work does not contribute to a single effort: the success of one account is independent of others. Thus, department members do not share a common goal and do not feel part of a team in the same way as software developers do. Nonetheless, frequent email and IM – hyperconnectivity – in client services support a sense of collaborative community where people advise and help each other, making all easily reachable.

Employees in both departments are invested in the success of the *organization*. They have chosen to work in KME because it is a high-tech firm, and they believe that its products can lead to large revenues. Many of the employees identify with the firm and see their own personal success closely linked to it. The ethic of contribution to the collective value is spurred by the involvement often found in startup firms that struggle to find a niche in the market place and require the support of employees to be successful. Many KME employees had given up

organizational process. They see shared understandings as a prerequisite for the development of trust. Unless people can develop shared understandings, it will be difficult for them to trust each other.

¹⁵ See also Heckscher and Adler (2005).

stable jobs in established companies with the hope that the startup will be successful and they will directly benefit from earnings. They believe they have better chances for advancement than in established organizations, and often have potentially-lucrative stock or options as part of their compensation packages. Their contribution to the collective value consists of high-performance, long hours of work, and high commitment to the firm's goals. Thus, the ethic of contribution occurs through increasing the collective value as well as contributing to the success of others.

Media for Collaborative Community

Communication at KME has moved from the physical space to the virtual realm, where conversations consist of typed words. Clearly, local virtualities flourish in this high-tech organization,¹⁶ where employees' work stations each have a computer terminal allowing them to easily send and receive messages via CMC. The physical setting is small, and people work in a crowded workspace. Moreover, people need to work with multiple others. Email – and especially IM – exchanges take less time than oral conversations allowing for a greater number of exchanges. Under these conditions, CMC is both more effective and less disruptive than oral communication – either FTF or telephonic.¹⁷ This heavy reliance on CMC has not weakened workers' sense of collaborative community.

Some scholars have argued that CMC's limited capability in transmitting social cues about communication partners – such as voice tone, facial expressions, and body gestures – diminishes people's sense of connectivity. They consider CMC to be an inappropriate form of communication to promote collaborative community.¹⁸ However, KME is permeated with strong social relationships, interpersonal trust, and vibrant networks of information exchange and coordination. Employees constantly help each other as they each have expertise in different areas and can pool together their knowledge toward joint problem solving.

CMC has not substituted for other forms of communication. Even though workers use CMC extensively to exchange messages and keep in touch with

¹⁶ The term virtual localities is not new and has been used before in the study of rural communities, where it is defined as the use of email as a communication tool among non-anonymous parties and contrasted with global virtuality which refers to exchanges among anonymous parties (Koskikallio, 2002). We use the term here differently to describe local work settings where people are physically near each other and use CMC to exchange information, share best practices, and socialize (see Quan-Haase and Cothrel (2003) for a more detailed description).

¹⁷ CMC is usually thought of as an alternative way of communication for long distance, boundary spanning exchanges (see Sproull and Kiesler (1991). Among the few studies of IM at work are Nardi, Whittaker and Bradner (2000). At KME, CMC is used for local exchanges as a result of a crowded work space and ease of use.

¹⁸ These ideas about the lack of social cues in CMC compared to FTF are discussed in Rice (1993), Fish, Kraut, Root, & Rice (1992).

colleagues, they continue to value FTF meetings and phone conversations. Employees make an effort to use the phone or to walk over to their colleagues' desks to ask them a question. They see in these FTF meetings an important occasion to chat and to connect on a more personal level, which CMC does not provide in the same manner. Furthermore, people often arrange to meet via IM to get a coffee at a nearby Starbucks or go out for lunch.

Exchanges with a social purpose occur frequently between coworkers, and they create a sense of belonging to the organization, provide social support, and create meaningful work relationships. People build relationships, and their exchanges provide them with friendship, humor, and advice. Even though CMC currently does not have the capacity to transmit certain voice, visual, olfactory or touch cues, it allows for coworkers to remain in contact and to exchange social messages.¹⁹

Trust is in part a precursor for these vibrant networks. People interact more easily with those who they trust and feel close. Cohen and Prusak contend that trusting relationships among coworkers are the basis for knowledge sharing and joint problem solving.²⁰ They see the ties that link coworkers as the key factor leading to the success of a firm as they facilitate the flow of resources. Strong, trusting relationships are particularly relevant in the context of CMC because CMC can interrupt people's work. Interruption is in particular evident with IM interactions, where the message automatically pop-up on the screen. Nevertheless, when a close relationship links two people, then they do not perceive the interruption as intrusive. Trust plays an important role because employees need to trust that others will use the various media in appropriate ways, so that they don't interrupt others' work processes.

To some extent, CMC provides high-tech employees with an easier and more convenient form of communication because it allows for fast and continuous exchanges.²¹ At KME, communication occurs almost simultaneously over multiple media, and not just sequentially. Employees often answer an IM and glance at their email while having a FTF conversation. IM takes priority over email, FTF, and the phone in this fast-paced environment, where people often must fulfill IM requests immediately. Thus, employees do not switch between media and people for communication, but rather use various media almost simultaneously to interact with different people.

¹⁹ Although not used at KME, internet phones provide voice contact that mimic traditional telephones. They may develop additional capacity at a later time. Desktop videoconferencing systems have been around since the early 1990s (see, for example, Mantei, et al., 1991; Herbsleb & Olson, 2004). There have even been prototypes of remote transmission of smell and touch (Strong and Gaver 1996).

²⁰ Cohen and Prusak (2002) refer to the sum of relationships among coworkers that facilitate the flow of resources (information, knowledge, social support, etc.) in a firm as social capital. Social capital constitutes the key factor for success in a knowledge economy.

²¹ See Kiesler and Sproull (1991) for first-order effects of technology. First-order effects of technology refer to increases in speed and efficiency related to the use of CMC in organizational communication.

In this local virtuality, fingers flying over keyboards appear to be easier than walking to another cubicle or picking up a phone. In light of media-message fit theories, the predominance of CMC is unexpected.²² Yet, employees are already at their computers and staring at their screens. The time spent writing an email or an IM generally is shorter than the time it takes to lead a FTF or telephone conversation. As a consequence workers can communicate with each of their communication partners more frequently and they can communicate with more partners. In this way, IM and email combine to create hyperconnectivity.

CMC does not function as an independent communication system. Email and IM frequently leads to FTF encounters among colleagues. Often, employees would greet one another over IM and arrange to meet for lunch or coffee.

Thus, email, IM, FTF, and the phone serve different communication purposes, often working in synergy and not in competition with one another. FTF and the phone are used for dealing with complex problems that require extensive discussion. 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. In addition, CMC provides unique features that are not available in FTF or phone exchanges. Email provides a medium to articulate complex issues and obtain responses that people can archive and refer to later. By contrast, IM serves as a meta-communication medium that affords informal talk about work, email exchanges, and other current organizational developments and concerns.

Computer Mediated Communication for Collaborative Community

CMC is not a single homogeneous medium.²³ Employees use email and IM in different ways.²⁴ Together, they help shape work community and trust at KME. Propelled through CMC, employees are to a large extent connected in real time opening the opportunity for a stream of constant exchanges. CMC has not only changed the speed of communication, but also its nature. Most obviously, both email and IM allow communication with spatially or temporally distant others, with email providing the additional ability to converse while not simultaneously logged on to the communication system. Employees can juggle multiple

²² Message-media fit theory contends that the characteristics of media lead to different media choices (Daft & Lengel, 1986; Daft, Lengel, & Trevino, 1987). Messages that are complex or equivocal are transmitted via rich media, such as FTF and the phone because lean media, such as email, are not adequate.

²³ The fact that people use various media for different purposes suggests that a single dimension ranging from lean to rich is not sufficient to describe and predict media choice and adequacy, as message-media fit theory has attempted (Daft & Lengel, 1986; Daft, Lengel, & Trevino, 1987). Various media serve different purposes in different social context. Thus, while message-media fit theory is not refuted by the observations at KME, it needs to be expanded to include other relevant dimensions.

²⁴ 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; Poe, 2001).

relationships, sometimes in small groups and sometimes in almost simultaneous one-to-one conversations. At KME, each person would have multiple IM windows open at the same time. Moving between IM windows – and thus conversations – is common practice. IM also partially solves the availability problem by providing information about who is logged on to the communication system, usually in their cubicle.²⁵ KME employees perceive sending an IM as a polite way of asking a question: the IM appears on the communication partners' screen alerting them of an incoming request, but unlike a phone call or FTF visit, the IM message does not force them to respond immediately.

KME has a strongly-emphasized culture of using IM. This is not only a matter of individual discretion, but also part of the norms of the organization. Employees rely on IM because of its speed and its real-time (synchronous) nature. Although employees could in principle ignore IM messages, in practice there is a norm of trying to reply within two minutes. This allows the senders of IMs to receive immediate feedback, at the cost of potentially interrupting the recipients. IM's ability to identify who is potentially available for contact promotes impromptu chats, requests for information, and clarification.

IM contributes to hyperconnectivity and facilitates collaborative community. Knowing whether other department members are connected or not and thus potentially available for communication creates a feeling of closeness and a sense of community. This is especially important in an environment where most employees spend the majority of their time sitting in cubicles in front of a desktop computer. IM provides the basis for routine exchanges that maintain a community of work. As IMs are not saved or archived, they represent a more transient, casual form of exchange. People often use IM for short social exchanges providing an opportunity to greet others or to share jokes. This promotes closeness among department members and integrates them into a web of online exchanges – both work and social. However, those with strong ties make more frequent use of IM than those with weaker ties. This strong-weak disparity is greater in IM than in email, phone or FTF contact.

People use email differently than IM. They would be more likely to send somebody they do not have a close, trusting relationship with an email because it is not synchronous and thus would not interrupt colleagues in their work. Furthermore, email is less often dashed off or used socially. Email leaves a record; it can be stored, checked at a later point in time and forwarded to other people in the department or organization. Email represents a more serious and instrumental form of communication. While people primarily use IM for one-on-one exchange of messages, email goes to a wider range of employees within the department and elsewhere in the organization.

²⁵ Nardi, Whittaker and Bradner (2000) conducted the first study to our knowledge about the use of IM in the workplace as a tool to identify other communication partners.

To a great extent, communication with other employees is the work of KME employees. They must obtain information; they must coordinate. Although hyperconnectivity creates new opportunities for exchange and collaboration leading to more dense networks, it also creates challenges. At times, IM-driven hyperconnectivity has negative effects on work processes. Each employee must deal with a larger number of requests that add up on a day-to-day basis. The social norms necessitate that employees be available for CMC, yet, KME employees frequently feel overloaded and at times overwhelmed by the number of incoming requests for information and coordination. Hypercommunication stops them from getting their “own work” done. Their densely knit, hyperconnected networks leads to interruptions while completing tasks. Employees are constantly multitasking, dealing simultaneously either with their own work demands and others’ requests for information. Employees say they do not mind being available to answer others information requests, but the problem is that they often are not able to control when these interruptions occur. Clearly, the ease of sending CMC adds to the volume of communication.²⁶

IM is the most disruptive, in part because the availability list allows people to know who else is around to communicate with.²⁷ It can have negative effects on work processes when employees feel overloaded with requests and cannot get their work done. Moreover, because people knew who else is around, they have expectations for how quickly they will get a response. When the expectations of rapid response are not met, conflict sometimes develops.

High-Tech Networking and Hierarchy

When we began studying KME we expected to find a networked, post-bureaucratic organization where people worked in shifting teams with multiple others, with little structured departmentalization and hierarchy. Instead, we have found KME to be a hybrid type of organization resembling an enabling bureaucracy, where rules about work and vertical and horizontal divisions of labor exist along with high levels of trust and community cohesion.²⁸

KME has an explicit hierarchy that relates people and functions. The hierarchy provides a way of organizing individuals around work tasks as well as coordination and communication. Decision-making takes place at the top of the hierarchy and are communicated to the bottom. The impression from the decision-

²⁶ These findings are similar to those of a study of interruptions and availability in managerial jobs which found that managers want to be accessible to others, while at the same time maintaining control over these interruptions (Hudson, Christensen, Kellogg, and Erickson, 2002). See also the experiment done by Dabbish & Kraut (2004) showing that frequent monitoring of availability displays seriously affects attention.

²⁷ Kellogg and Erickson (2000) describe how information about a user that is transmitted by a communication system can be used for making social inferences about the status of the communication partner, including inferences about awareness, availability, and accountability.

²⁸ See Adler and Borys (1996).

making process is that KME continues to be a hierarchical organization. The roles and statuses of people at KME are clearly formalized. People know what their role is, to whom they report, and what the adequate type of engagement is.

On the other hand, KME is an enabling bureaucracy where rules about work and vertical and horizontal divisions of labor co-exist along with high levels of trust and community cohesion. Employees enjoy sufficient freedom to perform their job without needing to report constantly to their boss and asking for permission. Their meta-awareness of the reporting structure – combined with hyperconnectivity, trust, expertise, and experience – allows employees to work largely independently while connected to a larger departmental and organizational enterprise.

Bureaucracy and collaborative community worked side by side in both departments. Nonetheless, there were differences between departments in regard to the extent to which hierarchy determined communication. The client services department had a more pronounced hierarchy than the software development department as shown in Figure 1. In the client services department, departmental members occupy similar positions in the information and social networks suggesting that employees trust each other and information flows regardless of hierarchical position. The managers – Sally, Peter, and Charlie – have as many information exchanges as departmental members. By contrast, in the client services department, managers – Sophia, Bridget, Anna, Mark, and Ben – receive many more information requests than departmental members. This suggests that communication follows the hierarchical structure of the department with managers occupying central roles in the flow of information.

Although hierarchy and collaborative community can exist side by side, one consequence is an imbalance of expertise between management and the department members. In the case of KME, this imbalance refers to the knowledge required to manage online communities, and to design and develop the new software. While management has expertise with regards to the market, the sales, and the clients, they don't have a full understanding of the day-to-day tasks and problems of department members. The downside of this imbalance in expertise is that management cannot provide sufficient guidance in the execution of tasks; employees need to develop the expertise themselves. This places large responsibility on department members. Management trusts that they have the expertise to develop their own plan of action.

What is the role of CMC in this interplay between hierarchy and collaborative community? CMC supports communication among all employees providing an effective way to overcome status barriers. As discussed above, this is particularly the case in the software development department where department members need to be in close contact and constantly exchange expertise. Although in this department, the hierarchy is explicit, employees communicate via email and IM with those colleagues who have the expertise they need regardless of their

hierarchical status. However, employees continue to be aware of status differences. While this is not reflected in their interactions within the department – where people knew each other and have established relationships of high trust – it clearly affects their interactions with the organization’s management. CMC supports communication with all employees within the department, but does not remove hierarchical barriers outside the department.

In the client services department, hierarchical position influences to a greater extent who talks to whom than it does in the software development department (see Figure 1). The role of hierarchy also influences interactions via CMC. One form of accountability that is inherent in relationships with status differences is that employees feel compelled to reply to messages because receivers of messages knew that senders are aware that they have received the message. Thus, the awareness of others’ availability leads to expectations in the sender about how long it should take the recipient to reply. A person’s status within the hierarchy of the organization plays a key role in how they are replied to.

Conclusions

KME is a *local virtuality*. Most communication is via CMC, both email and IM. The high reliance on CMC is particularly interesting in light of the physical proximity of all employees. They are going online to exchange email and IM with colleagues who are sitting right next to them. The high volume of CMC use, within the department and beyond it, strongly suggests that CMC does not weaken trust in this organization. It is the social structure and ethic of contribution of the organization that is important to the formation of collaborative community; not the communication media alone. The KME way of working collaboratively involves the simultaneous independence of jobs combined with interdependencies. Although KME is not a thoroughly networked organization, people often have multiple work networks. They work simultaneously and sequentially with different members of their department.

KME is *hyperconnected*. The adding on of CMC to FTF and phone contact has created hyperconnectivity where community members – at work or elsewhere – are always connected to CMC and always available for communication. Employees can easily send an email or instant message (IM) to any other member of the organization regardless of status or formal role.²⁹ Hyperconnectivity has led to new forms of collaboration, in particular the constant monitoring of IMs.

KME is *glocalized*. Its members not only communicate via CMC locally, but CMC is even more their predominant means of communication with clients

²⁹ CMC can also lead to changes in organizational structure; in particular as leading to flatter hierarchies and horizontal forms of communication (Sproull and Kiesler (1991). At KME, CMC permeated the organization from the beginning.

elsewhere. Rather than the utopian dream of CMC making community independent of distance, CMC has become the way to communicate in this high-tech organization, both locally and globally.

CMC at KME affords *trust*. Our research shows that colleagues do not have to be in FTF contact to trust one another. There are frequent shorthand IM conversations, so much so that we marveled at their apparent intrusiveness. There are equally as frequent more structured emails that leave more time for thought, allow attaching documents, and provide an archive and paper trail. CMC intertwines with FTF encounters: both formal meetings and casual conversations. Our findings suggest that it is a fallacy that FTF contact is the only trustworthy form of communication. In a milieu with much individual networking and little direct supervision, it is hyperactive CMC that fosters collaborative community and trust within and between departments.

CMC at KME is *personalized and individuated*. Media choice theorists originally thought that people would choose between personal, individuated FTF communication and de-individuated CMC. That is clearly not the case at KME, where CMC use is personally tailored to specific relationships of work and friendship, and where CMC communication is inextricably entangled with FTF communication. These are not two separate worlds. Rather, they are multi-media ways of communicating and informing within formal and informal relationships.

Despite the formal hierarchical bureaucratic structuring of KME's departments, the departments – and KME itself -- are also networked. Of course, organizations have always had informal networks, but hyperconnectivity at KME allows more fluid and more active use of networked relationships, what Barry Wellman has called *networked individualism* and we have relabeled *individualized networks*. More people have the possibility to have links to people outside the workgroup and organization. These links serve as interconnectors between multiple networks, providing access to new information and possibly more creative problem solving.

While on an organizational level communication among employees was strongly influenced by hierarchy, we observed that there were differences between departments with regards to the extent to which hierarchy determined communication. In the client services department, hierarchy influenced who talked to whom, over what medium, and about what much more than in the software development department. Employees in the client services department were more aware of the hierarchical structure and behaved accordingly. By contrast, in the software development department hierarchy was less important for communication. Here the nature of the information needed and the expertise of colleagues determine communication.

The evidence provides a view that is more routinized and stable than a "networked organization" but more flexible and hyperconnected than a traditional bureaucratic organization. Employees are organized into departments. These

departments significantly structure their work practices, and they are where most communication occurs - online as well as offline. Yet, KME is also a hyperconnected local virtuality. Within the stable framework of departments, its employees are communicating frequently and widely. There is no need to go to meetings; there is no need to get up from their cubicles. CMC provides them the flexibility and access to gain the information and coordination they need immediately – across and within departments. In short, while KME is not a networked organization, it is highly networked – with CMC networks providing the means for social networking.

Acknowledgements

Support for our research has been provided by BMO (the Bank of Montreal), Communication and Information Technology Ontario, the Institute of Knowledge Management (IBM), Mitel Networks, and the Social Science and Humanities Research Council of Canada. The first author acknowledges assistance from the Alumni Research Awards Program, Faculty of Social Science, the University of Western Ontario. We thank Paul Adler, Manuel Castells, Joseph Cothrel, Rob Cross, Charles Heckscher, Lynne Howarth, Richard Livesley, and Larry Prusak for their advice, and Alexis Kane Speer for her assistance. We especially want to thank all those employees at KME who completed the survey, and even more so, those who gave generously of their time with interviews and observations. A longer version of this chapter will appear in *Collaborative Community in Business and Society*, edited by Charles Heckscher and Paul Adler. New York: Oxford University Press, 2005. Used here by permission.

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