

COMMUNICATING IN THE 21ST-CENTURY WORKPLACE: A THEORY OF COMMUNICATION NEXUS

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The workplace is evolving into the communication nexus; a central connection point for messages among workers. Naturalistic observations of 69 workers in four U.S. high-tech firms identified three themes: (1) frequency of communication, (2) availability and use of multiple communication channels, and (3) need for instantaneous communication. A new theory of the organizational workplace as a communication nexus is presented here to explain new organizational communication phenomena and predict organizational communication in the contemporary workplace.

Keywords: Organizational communication, Communication nexus

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Over the years, organizational communication scholars have uncovered a vast array of different types of messages that are communicated within the organization. A review of the table of contents in Jablin and Putnam's 2001 *The New Handbook of Organizational Communication* demonstrates that researchers have examined issues such as organizational culture, communication networks, organizational entry and leadership. Other issues, including communication structures and processes, along with the advent and effects of new communication technologies have appeared in journal articles and texts.

However, few studies actually examine, record and report the communication events within the workplace. For example, while network analysis can provide information about with whom employees are communicating, questions dealing with the amount of time that an employee spends in communication events during a given work day and which types of communication channels are used remain unanswered. This omission can be explained in part by the limitations placed on researchers in their attempts to study workers in the workplace. This study was able to overcome this limitation via the ability to collect and analyze data collected through naturalistic observation rather than by relying on self-report data.

This access gave the researchers a first-hand look at the communication processes within four high-tech organizations and, as such, permitted the researchers to gain a better understanding of this important phenomenon. While findings from many earlier studies were supported, this manuscript adds a significant new layer of understanding of the centrality of communication within the organization. Whether the employee is engaged in face-to-face communication or using one of several modes of electronic/computer mediated communication, the results of this study suggest that workers spend substantial amount of their workday communicating information and also tend to engage in multiple communication events simultaneously. In the past, communication was centered within individual, however this study finds support for the idea that the organization rather than the individual has become the nexus of communication for the successful completion of work tasks.

Literature Review

In a recent study, Tenopir and King (2004) stated that high-tech design engineers spend nearly 58% of their workdays communicating, yet the manner in which these engineers communicate can vary greatly between different organizational and engineering environments. Tenopir and King suggest that both (1) the organizational context and (2) the nature of the work is a substantial predictor of the manner in which engineers will collect and communicate information.

Tenopir and King also note that there are many factors that influence the frequency and channel of communication that will be used in the workplace. For example, the researchers found that these professionals were more likely to

rely on oral communication with a colleague or an expert in the specific subject area from within their work teams to suggest subject specific information needs than they were to access a document on the subject matter being discussed.

Prior research has identified 13 methods of message delivery within organizations (Romei, 1997). The present study found that many of these methods are still in regular use (landline phone calls, cellular phone calls, email messages, voicemail messages, and pager messages). However, there was little evidence of the use of facsimile messages, interoffice mail, U.S. Mail, or U.S. Express Mail. Thus, communication tools and channels are dynamic and that it is useful to keep pace with developments in this area.

This manuscript reports the findings of an observational study of high-tech engineers in four large organizations in the United States in order to determine the frequency and channel of communication used in the modern workplace. The results and discussion will shed new light on the 21st-century workplace. Using a grounded theory analysis, these findings will help organizational scholars and practitioners to predict how communication will be used and how communication theory needs to be reexamined and reframed in order to embrace the new organizational reality.

Grounded Theory

A grounded theory methodology was utilized for this inquiry (Glaser & Strauss, 1967; Martin & Turner, 1986; Turner, 1983), with an aim of generating a descriptive and explanatory theory of the communication events at high-tech companies in the United States. This approach has been effectively used in many types of organizational research (i.e., Ancona, 1990; Elsbach & Sutton, 1992; Isabella, 1990; Kahn, 1990; Pettigrew, 1990; Sutton, 1987).

Grounded theory is used to develop a context-based, process-oriented description and explanation of the phenomenon, rather than an objective, static description expressed strictly in terms of causality (Locke, 2001). Thus, an inquiry utilizing the grounded theory methodology cannot have an existing theoretical underpinning.

As Martin and Turner (1986) state, grounded theory "is an inductive, theory discovery methodology that allows the researchers to develop a theoretical account of the general features of a topic while simultaneously grounding the account in empirical observations or data" (p. 141). Further, grounded theory facilitates "the generation of theories of process, sequence, and change pertaining to organizations, positions, and social interaction" (Glaser & Strauss, 1967, p. 114).

Method

For this study, design engineers and technical professionals were observed in their places of work as they completed their daily responsibilities. A total of

sixty-nine employees (58 men, 11 women) from four high-technology firms in the United States were shadowed in their respective workplaces. Women are historically under-represented in the high-tech engineering field and the employers, not the researchers, decided which employees would be observed. The events of an entire workday were captured (including lunch, meetings, etc). The data collected included observations about the physical work environment, the nature of communication, the amount of communication, and the range of technology used.

The researchers/observers were faculty and graduate student teams from a large Southeastern University. All members of the teams were trained in the technique of naturalistic observation. The research teams ranged from three to six members depending on the number of employees being shadowed and the length of time the teams were on location in each of the four firms.

Participants

The individuals that participated in the study were 69 active members of design and development teams for a product, service, or system within these four high-tech engineering firms. However, within these criteria, the participants held a variety of project roles and responsibilities, and their tenure at the firms ranged from new hires to experienced senior staff. Examples of participant job titles were: senior component design engineer, micro-architecture and logic design manager, principal electronic engineer, computer scientist and project manager, software engineer, advisory programmer, validation and testing engineer, technical lead.

Departmental staff members and those providing administrative support or lower-level project team support were not included in the study. Men and women of all ethnicities were eligible for participation. The participants were selected by the organizations being studied; the researchers had no input into which employees would be observed.

Table 1
Participants by Firm

Firm	Industry	Engineers			Observation	
		Total	M	F	Minutes	Hours
A	Semiconductors	22	18	4	8440	140.7
B	Microcomputer processing chips	29	24	5	9031	150.5
C	Medical devices	9	9	0	3720	62.0
D	Information technology	9	7	2	3190	53.2
Total		69	58	11	24381	406.4

The study was conducted in four organizations in the United States (a description of the organizations can be found in Appendix A). All four firms are classified as high-technology organizations: Firms A, B, and C were engaged in hardware development while Firm D developed software programs.

Naturalistic Observation

This study utilized a naturalistic observation qualitative methodology. Naturalistic observation, also known as shadowing, has been used in a number of studies for organizational communication (i.e., Kramer & Hess, 2002) as well as to observe the information behaviors of security analysts (Baldwin & Rice, 1997), psychology academics (Eager & Oppenheim, 1996), and social services departments (Wilson & Streatfield, 1981). The technique has also been used to study the information behaviors of music students (Notess, 2004), as well as web interface test participants (Thompson, 2003). Fidel, Pejersen, Clean, and Bruce (2004), employed naturalistic observation as one of the tools to better understand the information needs of high-tech engineers.

Observation Procedure

Some of the prior studies that have used naturalistic observation required the observer to maintain a socially acceptable distance from the person being observed and required that the observer not interfere with the tasks or habits of the worker (Eager & Oppenheim, 1996; Thompson, 2003). However, the studies that have focused on information seeking/behavior (Fidel et al., 2004; Notess, 2004; Wilson & Streatfield, 1981) have permitted the observer to interact with the participant to clarify issues related to the information or communication event.

Thus, in this study the observers were encouraged to communicate directly with the participants at discreet points throughout the workday. These discussions were used to clarify what the researchers were observing so as to better understand the reasons behind the communication processes being utilized. The conversations also gave the observer the ability to build a sufficient level of trust and comfort with the participant. In addition, the communication allowed the engineers being observed to feel comfortable communicating their feelings or thoughts about certain types of software or communications methods.

Observers were instructed to talk with the engineer/technical professional participants for any of the following reasons: (1) to identify a software package or process; (2) to understand the specific circumstances of an event (for example, determine whether a telephone call was scheduled, whether it was personal or

was business related, and whether the person being observed received the call from a landline or mobile phone); (3) to answer any questions that the participant may have about the methodology and purpose of the study; and (4) to better understand the employee's work environment, the work process, the information seeking process, or the communication in the workplace. Breaks and meals were also observed in order for the researchers to get a balanced view of the workday.

To protect the proprietary nature of the work being observed, observations were recorded to only a general level of specificity. For example, these data did not include specific internal product and personnel names, activities, or company-related information, nor did they include the specifics of a communication event (for example, the name of the other participant in a conversation was not recorded).

Coding Instrument

During the observations, these data were recorded on an instrument designed specifically for this study, one that permitted the observers to non-intrusively record their observations of both the communication events and the technologies used. After observations were completed at the first company [Firm A], the team made revisions to the observation instrument and added a special form for organizational meetings specifically designed to capture the context, activities and key events that occurred during these interactions. No new or different data were collected at the later firms, the new format simply made the coding process easier. The new meeting data collection instrument captured communication and information events for each meeting, as well as details about the number and nature of meeting attendees, room layout, time, and technology available and used.

The observations were monitored and recorded in ten (10) minute increments during the workday. After each 10-minute period, the observer began entering data on a new coding sheet. Both the duration of the event within the ten-minute increments as well as the total duration of each event were recorded. For example, if a telephone call started five minutes into a ten-minute observation period and lasted for 10 minutes, it would be recorded for five minutes in the first observation point, five minutes in the second observation point, and also that the call lasted for a total of 10 minutes.

After the data were collected, a data set was developed to standardize terminology and to provide a consistent way to handle data collected in each communication and information event type. For each event, a record of the time, duration, type of event, technological medium, description, and an explanation of the event's purpose or goal [i.e.: task or social] was coded and entered into the data file. Research team members coded their own data for each person

they observed. Information from the observation sheets was collected by the data manager and a master file was constructed.

Analysis

As detailed above, a grounded theory approach (Glaser, 1978, 1992; Glaser & Strauss, 1967; Strauss, 1987; Strauss & Corbin, 1990) was used in order to permit the inductive discovery of theory from the observation of the phenomena. Strauss and Corbin (1990) state that grounded theory is:

inductively derived from the study of the phenomenon it represents. That is, discovered, developed, and provisionally verified through systematic data collection and analysis of data pertaining to that phenomenon. Therefore, data collection, analysis, and theory should stand in *reciprocal* relationship with each other. One does not begin with a theory, then prove it. Rather, one begins with an area of study and what is relevant to that area is allowed to emerge. (p. 23)

Results

These findings indicate that communication is not only central to the daily work life of the 21st-century employee, but it is the organization that acts as the communicator. The findings support Tenopir and King's (2004) study, where high-tech engineers were found to spend slightly over half their workday communicating.

As expected, many of the traditional methods of communication remain in use in the modern workplace (Romei, 1997). For example, the present study found that land-line and cellular phones, voicemails and pagers were heavily utilized for communication by the workers; however there were no observation which detailed the use of mail or other non-electronic written forms of communication. This suggests that communication tools and channels are changing and that it is essential to keep pace with developments in this area. One of the four firms made extensive use of pager technology, while the other three firms did not incorporate this into their communication activities.

The findings suggest that landline phones are still important and utilized. Both wired and cell phones are important for communication inside and outside the organization, although landline calls are still dominant and accounted for the majority of the telephone communication events. The telephone, both landline and cell, accounted for between 8% and 20% of all communication events at each company. Interestingly, the company with the highest percentage of telephone events was the one engaged in building phone-related technology.

Voice mail has become less significant than in the past. While all telephones were equipped with voice mail, that feature was the least used communication technology. When asked why, respondents suggested that if the communication were truly important, it would have been sent via a more urgent medium, such as email, instant messaging (IM), or in the case of one company, by cell phone or pager. The belief was that voicemail is a passive medium, and hence will be checked only on occasion, while email and IMs are attended to almost immediately.

Email has become one of the most important forms of communication and the email attachment feature may explain why there has been a reduction in the use of facsimiles, U.S. Mail, U.S. Express Mail, and overnight couriers. Email was used for both communication and for information documentation as many companies used the technology to record activity. It was common for management to direct an employee to send a follow-up email to all parties involved in an ad-hoc meeting or telephone conversation to serve as minutes or a record of the meeting.

Instant messaging is a new form of message that has emerged in recent years. However, the use of IM was still much less common than email; in fact, some companies never used IM, and it accounted for only a small percentage of overall communication minutes. Based on the limited use of IM that was observed, it is likely that the critical mass of IM users has not yet been reached at those firms and that engineers can assume that the person with whom they are working may not have the ability or software required to respond to the message.

Multitasking is becoming an expected part of the engineer's communication environment. For example, engineers might juggle email correspondence and a telephone conversation.

It is important to note that face-to-face communication is still popular among engineers and that task related face-to-face events were more prevalent than relational/social interactions. What this suggests is that engineers still appreciate traditional forms of communication, and the richness presented by face-to-face has value for selected workplace tasks. By contrast, face-to-face accounted for only about 10% of the communication minutes in one firm, suggesting that some firms either do not facilitate or actively discourage face-to-face communication. The differences are likely a result of corporate culture.

Table 2 indicates that email was the most used communication medium in two of the organizations while face-to-face was the most used in the other two firms. The difference between these sets of firms is the size of the overall work unit. The larger units use email while the smaller units prefer face-to-face.

Table 3 displays the percentage of minutes in each of the different communication categories. This table demonstrates that one advantage of email over face-to-face communication is speed. For example, while email accounted for

32.6% of communication events at Company A, it only took 8.9% of the time devoted to all communication events. Thus, email is much more efficient than is face-to-face.

The data were converted into standardized measurements and the analysis is presented in Table 4.

Table 2
Communication Events:
Percent of Incidents by Communication Event Category

Firm	N	Email	F2F	IM	Meeting	Pager	Phone	Writing
A	22	32.6%	23.2	5.5	4.5	6.0	19.7	8.4
B	29	53.6%	20.2	2.1	7.3	0	13.4	3.4
C	9	31.2%	42.7	0	3.1	0	16.2	6.8
D	9	26.0%	31.7	25.3	2.4	0	7.9	6.6

Note: F2F = Face to face, IM = Instant messaging, Firm A was the only one to use pager technology

Table 3
Communication Events:
Percent of Minutes by Communication Event Category

Firm	N	Email	F2F	IM	Meeting	Pager	Phone	Writing
A	22	8.9%	23.2	.8	50.2	1.4	12.2	3.3
B	29	16%	15.6	.5	62.4	0	4.7	.8
C	9	16.4%	40.4	0	32.3	0	7.0	4.0
D	9	18.7%	42.9	12.5	12.2	0	8.2	5.5

Note: F2F = Face to face, IM = Instant messaging, Firm A was the only one to use pager technology

Table 4
A Comparison of Engineer Participation in Each Type of Communication Event

Firm	N	Email	F2F	IM	Meeting	Pager	Phone	Writing
A	22	SBA	A	A	AA	—	WAA	WAA
B	29	WAA	SBA	SBA	WAA	0	A	WBA
C	9	BA	AA	BA	SBA	0	BA	A
D	9	BA	SBA	WAA	BA	0	SBA	WAA

Note: F2F = Face to face, IM = Instant messaging, Firm A was the only one to use pager technology, WBA = Well below average, BA = Below average SBA = Slightly below average, A = Average, AA = Above average, WAA = Well above average

Discussion

As detailed above, the grounded theory approach is designed to create theory from observation (Glaser, 1978, 1992; Glaser & Strauss, 1967; Strauss, 1987; Strauss & Corbin, 1990). The resultant theory needs to connect the observed events into a unified web that attempts to explain the phenomena (Hawes, 1975). The goal of theory in this type of approach is to generate descriptions, insights and explanations of events and to see them from the perspective of the organizational member (Gioia & Pitre, 1990).

These results demonstrate that a substantial change or shift in importance of the communication channel has taken place in these organizations. An understanding of these phenomena can be used as a method of prediction for how other, non high-tech firms will communicate in the future. There is reason to believe that high-tech organizations can be deemed to be "innovators" in the diffusion of innovation model as related to organizational communication.

Implications for Management

Engineers consider many factors when choosing a method of communication. At times engineers chose a communication channel because it was most convenient or because the channel itself would help clarify a situation. Engineers also respond to symbolic cues and recognize that there is both the content of the message and the power of the medium. Generally, the findings indicate that team members working closely on a project engaged in less formal channels of communication such as casual face-to-face exchanges, casually written emails, and IM. When engineers were working with individuals who were not in their immediate work group, they used more formal channels of communication such as attaching meeting presentation files and formally written emails.

The three themes that emerge from this data are: (1) the frequency with which employees engage in communication during the workday; (2) the availability and use of different channels to achieve these communication events; and (3) the need for instantaneous communication. Thus, the findings present a multiplicity of concerns for the employee: efficiency and effectiveness of communication, selection of the proper medium, and speed of message delivery.

Email communication was found to be used extensively when the partner was located in a different physical location. Often, email's unique features were used to augment communication with people within the same physical location.

Overall, face-to-face and email communication were found to be the most used communication types in the organizations under investigation. Through the observations, it became evident that these two are used in conjunction with one another. As noted, after a face-to-face encounter, it was standard protocol for one of the participants, typically the one lowest in organizational status, to email a summary of the communication event to the other participants. This

summary will then become the historical document for the archiving of the information. Thus, a strong relationship exists between the use of these two channels of communication.

The use of email as a record-keeping technology was one of the unexpected findings in this inquiry. However, this suggests a strong linkage between email and the other forms of communication as well. This is a new usage of the communication technology, and while it does not relate to email's communicative abilities, it does identify another use of the technology. These data suggest that email is used for its ability to easily transmit, store and search for information at a later time, not simply to communicate a one-time only message.

Tables 2, 3, and 4 offer an intriguing picture of the 21st-century workplace. First, there is no clear preference as to one type of medium over another. While email is preferred in two firms, face-to-face is preferred in the other two. This suggests that it is the size of the unit under observation that best predicts the media that will be utilized. The larger the unit, the more likely that email will be the prominent medium.

While a communication preference was not found, interesting patterns of communication did emerge. When an employee who worked in a cubicle wanted/needed to communicate with another, he or she would pick up the landline telephone first. After two rings, it was determined that the other party was not in his/her workspace, so the caller would hang-up. As noted above, voice mail messages are deemed to be passive and an inefficient way to contact another. In Firm A, the sender would then use the pager to contact the other person. In the other firms, an email would be sent. Regardless of the technology or medium used, a prompt, almost instantaneous, response was expected.

Email is an essential communication tool especially when the work group was housed at different sites around the world. Email is appreciated because it allows engineers to address an issue immediately, even if the response is asynchronous. Also, email is useful because it can focus communication to a key group, and it has the ability to create an archive that traces the history of the problem being addressed. Each of these characteristics is especially important for work teams that are spread across the globe and working in different time zones.

Email usage in the corporate environment is continuing to evolve beyond its use as a communication channel. As noted above, it is becoming an essential information file. In the past, documentation retrieval was a difficult and time-consuming process. Further, assigning employees the task of documentation during the development process was an unwelcome task. Today, email messages can document every aspect of the project and hence bring a new dimension to project record-keeping.

Email messages are easily sorted, filed and retrieved, making them a convenient document of record. When searching for an archived email, an engineer might scroll through the account or use the email find feature. This is in marked contrast to much of the existing research that focuses on dyadic exchanges.

Email's importance and the range of ways it is used suggest that engineers appreciate any tools that help them organize records and retrieve them as needed.

Firm A provided all of its employees with pagers, and as noted, this technology was well used within this one organization. During the observations, it was noted that an employee was expected to respond to an electronic page within three minutes of receipt. Thus, it was common to see people reading and responding to pages throughout the day and in all organizational settings including meetings and lunch.

As with any inquiry into the adoption of technology, the diffusion of the new form of communication technology into the organization will help to dictate its usage. Instant messaging is the newest form of communication technology currently being used in organizations. As indicated in Table 2, Firm D (the only software firm in this study) had incorporated this technology into its organizational communication culture. The hardware firms were less likely to use this medium indicating that software engineers may be quicker to adopt new software programs than are hardware engineers.

Electronic forms of communication are also seen to be time saving. A quick email or IM is faster than a telephone conversation, and in the fast-paced workplace, this becomes an important consideration. Additionally, email and IM can be negotiated while carrying out other tasks such as talking with a coworker. This need for rapid and efficient communication does not seem to be related to physical proximity as employees are just as apt to email a person in the next cubical as a person on the other side of the globe.

In the organizations that were observed, communication was connectivity. Both task and social goals were accomplished via both electronic and face-to-face communication channels. Multiple channels of communication have been made available to the employee, and it is up to the individual to select which channel to use in the particular circumstance.

As mentioned above, the findings present a multiplicity of concerns for the employee: efficiency and effectiveness of communication, selection of the proper medium, and speed of message delivery. This study has demonstrated that the existing theories of communication selection do not address the reality of the 21st-century high-tech workplace. For example, the theory of media richness has offered one explanation for choosing an appropriate communication channel (Daft & Lengel, 1984, 1986). The theory sets out four criteria to determine the "richness" of a given channel. These criteria are (1) the availability of instant feedback, (2) the use of multiple cues, (3) the use of natural language, and (4) the personal focus of the medium. The channels that have all or many of these characteristics are considered "rich" media, while the channels that have few of these qualities are "lean" media. On the rich end of the continuum is face-to-face interaction, which has all four of the criteria listed above. On the lean end are nominal information exchanges, such as bulletin boards and signage.

All organizational communication messages vary in their level of ambiguity, thus an effective employee must understand and control the possibility of conflicting and multiple interpretations of a message. Thus, as communication technologies differ in their ability to carry and convey information, employees must seek out the correct technology to match the ambiguity demands of the message. For example, videoconferencing is thought to be quite rich, falling only slightly below face-to-face communication on the rich-lean continuum (Kydd & Ferry, 1994; Short, Williams, & Christie, 1976).

However, the Media Richness model is not universally accepted. A current debate centers on whether the characteristics of the various media are really objective and stable (Dennis & Kinney, 1998). Dennis and Kinney compared the richness of computer-mediated format (text) to an audio-video channel (like videoconferencing). The results challenge Media Richness theory, at least for the new media studied. While subjects were able to recognize differences in media richness, the media itself had no significant effect on decision quality, consensus and communication satisfaction. Thus, Dennis and Kinney (1998) suggest that Media Richness may explain the old media, but may not be a good theory for newer technology. These findings also suggest that managers seeking to improve performance should begin by examining the fundamental characteristics of a medium. For example, if feedback is required to properly achieve the goal of the message, then the sender must look for a medium with adequate feedback potential.

Trevino, Lengel and Daft (1987) and Rice (1991) suggest that the type of message also impacts the channel selection. Trevino et al believe that managers are likely to choose a rich medium when dealing with an ambiguous or personal message, but can use a lean medium at other times.

While this theory may be useful in understanding why a particular channel was selected, it does not address the choices that employees make between channels of similar richness, for example the use of email versus an IM (Dennis & Kinney, 1998). Further, this theory has been criticized for its failure to recognize the influence of organizational culture (Fulk, 1993; Fulk, Schmitz, & Steinfield, 1990). Fulk et al. (1990) proposed the social influence theory that posits that the medium choice is influenced by social factors in addition to the objective "richness" of the medium.

Selection of a communication channel may be impacted by the sender's perception of the medium and its quality. Short, Williams, and Christie (1976) suggest that social presence plays an important role and that the level of interpersonal involvement between the sender and the receiver will be analyzed when selecting the proper media. Rice (1983) extends this by suggesting that "those who are more aware of a medium's social presence may well choose more appropriate media and experience somewhat better communication or work performance" (p. 453).

Sullivan (1995) noted that the introduction of electronic (email) communication within an organization will have an effect on the selection of the medium used to communicate. "Communication tasks that previously had been accomplished by face-to-face or the telephone (for example, answering questions or co-drafting documents) are being replaced by email" (p. 63). However, email is seen as a lean-medium, so it seems that the ease and convenience of the medium, as well as the immediateness of the communication is more important than the rich-lean distinction of media richness theory.

Lastly, the globally dispersed organization offers a new challenge for media richness theory. Distance plays a large role in media selection. For example, regardless of the message to be sent, employees might choose face-to-face communication if physical proximity is not a problem or IM if the work partner is in a remote location.

The Theory of the Organization as a Communication Nexus

The above detailed theories do not adequately describe what was observed in these workplaces. Rather, the themes of communication and message frequency, availability and immediacy concerns are indicative of the need for a new theory that will explain and predict communication in the 21st-century organization.

The findings suggest that communication has become the tool that is most used by the employee to do his/her job. The expectation of the employer is that the employee will use this tool effectively. Further, the employer expects that this tool will create an intellectual community within the organization that supersedes the boundaries of the office place. Employees reported that they were just as connected at home as they were at work, and that in a global 24/7 world, they needed to keep abreast of what was happening, regardless of when and where it occurred.

Thus, the theory that emerges from this research project is that the organization, and not the employees, is the communication nexus. In this role, the organization links the sender and receiver of the message to the context within which the message is sent. The organization becomes the conduit as well as the core of the communication, yet the members of the organization no longer need to be physically within the organizational boundaries to engage in the communication event. In sum, the communication is organizational connection, and the organization as communication nexus becomes the context within these interactions.

For a theory to be beneficial to the discipline, it must be a model of a phenomenon that naturally occurs. Through the observations in this study, the phenomenon is that of almost continuous communication. This communication took place over a variety of media, from face-to-face to telephone to email and IM. These workers felt compelled to communicate with their colleagues throughout

the workday, regardless of the other's location. Further, the expectation of an almost immediate response was part of the organizational culture in all four firms. Where communication formerly was the avenue used to gain workplace information, it now appears that the communication is the information, not the information container. It is equally important for the worker to gain knowledge from the communication event as it is to be a part of the communication event.

The advent of multiple communication media and communication technologies permit the workers to behave as though they are working in a group when in reality they are sitting alone in their individual cubical. The almost instant response mirrors the dyadic interpersonal/face-to-face experience.

Unlike media richness theory where the focus was on one aspect of the media, this new model of communication behavior focuses on the entirety of the communication event. Whether the medium is lean or rich is not as relevant as whether the medium is able to incorporate "richness" or "leanness" into its ease of use, quick availability and instantaneous feedback. Even a lean medium like email become rich when the response comes in almost a real-time conversational modality. Thus, the theory of the organization as a communication nexus can model the three-prongs of the modern-day organizational communication process: frequency, availability, and instantaneousness.

Directions for Future Research

While not detailed in this manuscript, all four organizations employed a diverse workforce and engaged in business activities across the globe. Additional research should determine whether these findings apply to locally based firms as well as to multi-national organizations and to domestic versus global workforces.

Organizational culture was found to be a moderator variable in this analysis. For example, only one firm provided pagers to its employees, and the use of the pager was ingrained into an employee's acceptable communication behavior. Another example of organizational culture was the amount of time that is acceptable for an employee to respond to a message; one firm expected immediate response no matter what else was happening while another firm permitted an "acceptable amount of time" with the understanding that other organizational circumstances may cause a slight delay in response. Future research on the effects of culture on this model will help in its predictive value.

Lastly, researchers should investigate whether it is possible to have too much communication in the workplace. During the observations, many employees complained that they simply don't have enough time to get their work done during the traditional 9-5 workday. Most of the observed employees mentioned that have home offices and they know that they will spend time working at home to complete the work not finished while at the office. At one firm, there

was an expectation that all employees keep their cell phones nearby even while sleeping since someone in India or China may need to reach them.

The 21st-century workplace is evolving into a communication nexus—a center or connection of messages among and between workers involved in various aspects of achieving the organization's goals. A proper understanding of the role of communication will assist in improving all aspects the 21st-century organizational experience.

Limitations of the Study

The limitations of this study include the problems of generalization of these findings into a non high-tech workplace. While there is ecological validity in this study, there remain questions as to how well this new theory can predict communication use within non-high tech firms. Future research in other types of organizations needs to be undertaken to determine if these findings are happening in all organizations or only in technology-based firms. Additionally, naturalistic observation always leads to the possible limitations most often associated with the Hawthorne effect. The researchers were cognizant of this potential limitation and worked to ensure that they were an unobtrusive as possible.

Since the researchers had no input in the selection of the employees that were shadowed, there is a possibility that the firms selected individuals who were likely to fully demonstrate the core values of the organization. Also, this methodology of this study permitted only the observation of culture but no understanding of the employees' perceptions of the culture or of its positive or negative impact on their work life.

There are very few women employed as engineers in the high-tech firms that were observed. However, the researchers believe that every woman that could have been part of the sample was intentionally selected by the firms to be included in the study. As such, while on the surface it appears that the sample was skewed towards men, there was in fact an over-representation of female employees in this study.

References

- Ancona, D. (1990). Outward bound: Strategies for team survival in the organization. *Academy of Management Journal*, 33, 334–365.
- Baldwin, N. S., & Rice, R. E. (1997). Information-seeking behavior of securities analysts: Individual and institutional influences, information sources and channels, and outcomes. *Journal of the American Society for Information Science*, 48, 674–693.
- Daft, R. L., & Lengel, R. H. (1984). Information richness: A new approach to managerial behavior and organization design. In B. M. Staw & L. L. Cumming (Eds.), *Research in organizational behavior* (6th ed., pp. 191–233). Greenwich, CT: JAI press.
- Daft, R. L., & Lengel, R. H. (1986). Organizational information requirements, media richness, and structural determinants. *Management Science*, 32, 554–571.

- Dennis, A. R., & Kinney, S. T. (1998). Testing media richness theory in the new media: The effects of cues, feedback and task equivocality. *Information Systems Research*, 9, 256-274.
- Eager, C., & Oppenheim, C. (1996). An observational method for undertaking user needs studies. *Journal of Librarianship and Information Science*, 28, 15-24.
- Elsbach, K. D., & Sutton, R. I. (1992). Acquiring organizational legitimacy through illegitimate actions: A marriage of institutional and impression management theory. *Academy of Management Journal*, 35, 699-738.
- Fidel, R., Pejtersen, A. M., Clean, B., & Bruce, H. (2004). A multidimensional approach to the study of human-information interaction: A case study of collaborative information retrieval. *Journal of the American Society for Information Science and Technology*, 55, 939-953.
- Fulk, J. (1993). Social construction of communication technology. *Academy of Management Journal*, 36, 921-950.
- Fulk, J., Schmitz, J. A., & Steinfield, C. W. (1990). A social influence model of technology use. In J. Fulk & C. Steinfield (Eds.), *Organizations and communication technology* (pp. 117-142). Newbury Park, CA: Sage.
- Gioia, D. A., & Pitre, E. (1990). Multiparadigm perspectives on theory building. *Academy of Management Review*, 15, 584-602.
- Glaser, B. (1992). *Basics of grounded theory analysis*. Mill Valley, CA: Sociology Press.
- Glaser, B., & Strauss, A. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Chicago: Aldine.
- Hawes, L. C. (1975). *Pragmatics of analoguing: Theory and model construction in communication*. Reading, MA: Addison-Wesley.
- Isabella, L. A. (1990). Evolving interpretations as a change unfolds: How managers construe key organizational events. *Academy of Management Journal*, 33, 7-41.
- Jablin, F. M., & Punam, L. L. (2001). *The new handbook of organizational communication: Advances in theory, research and methods*. Thousand Oaks, CA: Sage.
- Kahn, W. A. (1990). Psychological conditions of personal engagement and disengagement at work. *Academy of Management Journal*, 33, 692-724.
- Kramer, M. W., & Hess, J. (2002). Communication rules for the display of emotions in organizational settings. *Management Communication Quarterly*, 16, 66-80.
- Kramer, M. W., & Hess, J. A. (2002). Communication rules for the display of emotions in organizational settings. *Management Communication Quarterly*, 16, 66-80.
- Kydd, C. T., & Ferry, D. L. (1994). Managerial use of videoconference. *Information and Management*, 27, 369-375.
- Locke, K. (2001). *Grounded theory in management research*. Thousand Oaks, CA: Sage.
- Martin, P. Y., & Turner, B. A. (1986). Grounded theory and organizational research. *Journal of Applied Behavioral Science*, 22, 141-157.
- Notess, M. (2004). Three looks at users: A comparison of methods for studying digital library use. *Information Research*, 9, Retrieved March 25, 2006, from <http://informationr.net/ir/9-3/paper177.html>.
- Pettigrew, A. M. (1990). Longitudinal field research on change: Theory and practice. *Organization Science*, 1, 267-292.
- Rice, R. E. (1993). Media appropriateness. *Human Communication Research*, 19, 451-484.
- Romei, L. K. (1997). Busy isn't the same thing as 'productive.' *Managing Office Technology*, 42 (9), 7.
- Short, J., Williams, E., & Cristie, B. (1976). *The social psychology of telecommunications*. London, New York: Wiley.
- Strauss, A., & Corbin, J. (1990). *Basics of qualitative analysis*. Newbury Park, CA: Sage.
- Strauss, A. (1987). *Qualitative analysis for social scientists*. Cambridge: Cambridge University Press.

- Sullivan, C. B. (1995). Preferences for electronic mail in organizational communication tasks. *Journal of Business Communication*, 32, 49–63.
- Sutton, R.I. (1987). The process of organizational death: Disbanding and reconnecting. *Administrative Science Quarterly*, 32, 542–569.
- Tenopir, C., & King, D.W. (2004). *Communication patterns of engineers*. Piscataway, NJ: IEEE Press.
- Thompson, S. M. (2003). Remote observation strategies for usability testing. *Information Technology and Libraries*, 22, 22–31.
- Trevino, L. K., Lengel, R. H., & Daft, R.L. (1987). Media symbolism, media richness, and media choice in organizations: A symbolic interactionist perspective. *Communication Research*, 14, 553–574.
- Turner, B. A. (1983). The use of grounded theory for the qualitative analysis of organizational behaviour. *Journal of Management Studies*, 20, 333–336.
- Wilson, T.D., & Streatfield, D. R. (1981). Structured observation in the investigation of information needs. *Social Science Information Studies*, 1, 173–184.

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Appendix A: Description of Organizations

- **Firm A** Headquartered in the southwestern United States, Firm A designs and manufactures semiconductors with applications in automotive and consumer electronics, industrial control, motor control, networking, and wireless industries. Firm A is also making advances in software design, such as creating embedded Linux components for its products, expanding its work in the mobile and wireless entertainment sectors and continuing its work in silicon technologies. Firm A has design, research, manufacturing, and/or sales operations in more than thirty-two countries and has 22,200 employees world wide. Firm A's first quarter reports for 2005 show net earnings in excess of \$85 million dollars, and sales in excess of 1.44 billion dollars. The research team observed 22 engineers (18 men, 4 women) while at Firm A and performed observations for a total of 8440 minutes (140.7 hours). For purposes of this study, Firm A will be classified as a hardware business.
- **Firm B** Firm B, based on the West Coast of the United States, is one of the world's leading manufacturers of microcomputer processing chips. Firm B also produces computer networking and communications products. In 2004, Firm B employed over 91,000 people world wide and reported over \$34 billion in revenue. Firm B's operations are carried out in 294 offices and facilities world-wide. At Firm B, the research team collected data from 29 engineers (24 men, 5 women), and spent a total number of 9031 minutes (150.5 hours) in observation. For purposes of this study, Firm B will be classified as a hardware business.
- **Firm C** Firm C designs, develops, manufactures, and distributes cardiovascular medical products such as pace makers, arterial catheters, and implantable cardioverter defibrillators. Headquartered in the Upper Midwest region of the United States, Firm C employs over 12,000 people and has major operations throughout the United States and Europe. Firm C has experienced several record sales years since its beginning in 1994, and considers itself to be a 'world leader' in the industry. The team shadowed 9 engineers (9 men; 0 women), and spent a total of 3720 minutes (62 hours) in observation. For purposes of this study, Firm C will be classified as a hardware business.
- **Firm D** Firm D is a world leader in information technology and specializes in the production and development of information technologies, including computer systems, software, networking systems, storage devices and microelectronics. Firm D has manufacturing and research operations in North America, Asia, and Europe, and employs in excess of 329,000 workers world wide. Firm D reported overall revenue of over 96 billion dollars in 2004. In addition to its IT operations, Firm D offers services in areas such as business consulting, banking, and insurance, in addition to automotive products. While Firm D is headquartered in New England, the research team collected data from nine engineers, (7 men, 2 women) and spent a total of 3190 minutes (53.2 hours) in observations at one of its southeastern United States regional locations. For purposes of this study, Firm D will be classified as a software business.

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